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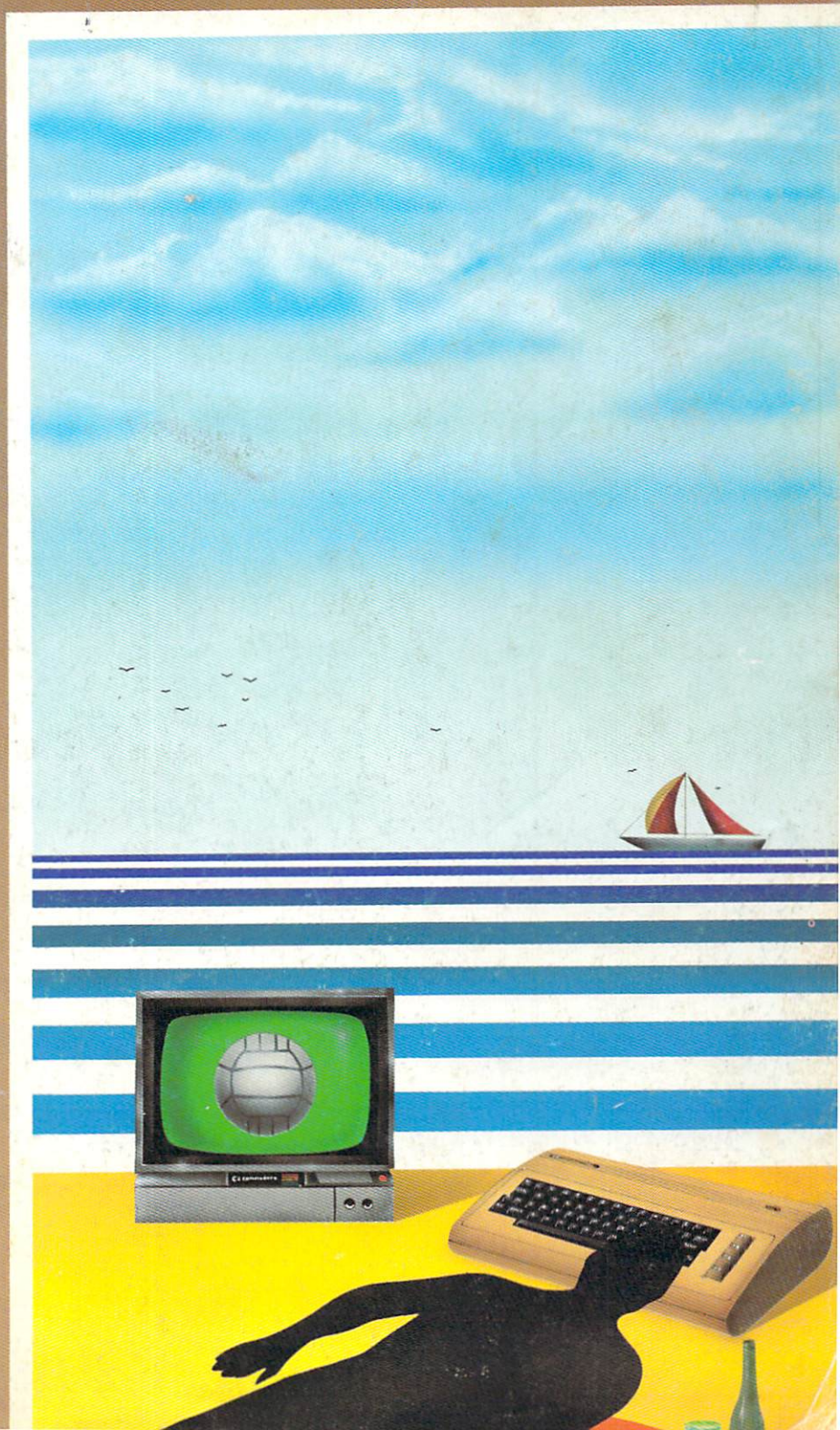

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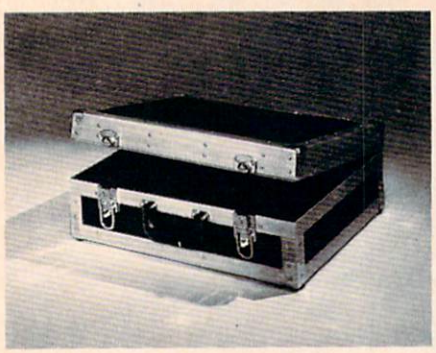

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EDITORIAL

The most controversial topic in the computer industry today is copyright protection. More to the point is the lack of adequate laws to protect the authors and manufacturers of software (and hardware). The Supreme Court, with their Betamax decision, altered the concept of 'fair use' as a defense for copyright infringement. The decision implies that devices used for copying copyright material are "staple articles of commerce;" provided they perform functions other than copyright infringement. Although the Betamax case was specifically concerning video recording for home use, the computer industry will ultimately feel the impact of the ruling.

What does this mean to authors and manufacturers who spend large amounts of time and money to develop computer products? It simply means that the development of copy protection schemes will be more of a consideration when creating new products. The people involved in creating and marketing computer products have every right to protect their profits. The consumer will be seeing, and paying for, more and better protection schemes. Every time a program or product is duplicated without proper authorization, it is money lost by the author and distributor. It is unfortunate that at a time when home computing has reached a price range reasonable to the average consumer, the added cost of protection schemes will be reflected in the market place.

This brings us to the unique position of computer publications. Programs are published each month with the intent that the subscriber will use the material for their personal library only. The programs are not to be copied and distributed as public domain software. One users group has suggested that they type the programs listed in a magazine, copy and sell the disk to club members only if they show proof that the member owns a copy of the publication from which the program originated. That seems to be a fair and equitable way to solve a potentially troublesome situation.

We would like to hear as much input as possible on this subject. Any opinions, comments or suggestions from our readers will be welcomed. Please indicate if your response may be published. Address correspondence to The Editor, *COMMANDER* MAGAZINE, P.O. Box 98827, Tacoma, WA 98498.

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COMMAND POST

by Jim Grubbs

For many people, summer time is a time for outdoor activities. Amateur radio enthusiasts are no exception, though sometimes the slant of the activities is very radio oriented. For years it seemed like my dad, W9DXA, and I always spent the Fourth of July installing our antenna system. It's a time for field day and transmitter hunts. The hamfest season is upon us with the promise of a lot of computer goodies being exchanged as hams upgrade their systems. If you haven't yet bought a computer, don't overlook the very versatile VIC-20 — it was made for the hamshack!

If you are an outdoor person, enjoy the sunshine and taking your rig along on a camp out. But don't lose your summer copies of *COMMANDER*. I'll be right here with some projects that will still be of interest next fall.

WHERE'S THE BEEF

When you bought your computer, it wasn't very smart. It was born with some basic motor skills called an operating system. It didn't develop a personality until you loaded in the first program. Hopefully, you have written some programs yourself. Your continued interest in this hobby is undoubtedly directly proportional to either writing or obtaining programs that are of interest to you. The 59th version of a PAC person gets a bit old. I can't help but think of that poor little lady in the popular hamburger chain commercial that agrees the bun is sure big, but where's the beef? In our case, the computer is nice, but where are the programs. COMMAND POST helps to fill this need, and for a price there are some extremely nice software packages for amateur use. Unfortunately, I can't address every subject in this column every month and most of us don't have unlimited financial resources. What we do have is our amateur radio equipment, a quite effective means of communicating around the world. Can we possibly tie in to this gear and exchange programs with our friends around the world? You bet we can!

FILE IT FOR FUTURE REFERENCE

It would be nice if you could simply take a program saved earlier to tape or disk and send it directly over the air to someone on the other end. It could be done, but without some very sophisticated programming and hardware, this method would only work between identical computers. They would still have to be interfaced properly to the equipment. I'm always looking for an easy way out, so I figured there has to be an easier way.

Let's consider for a moment what happens when you LIST a program on your computer. When the operating system of your computer sees the command LIST, it checks memory to find the beginning of the program that currently is active in your computer. It then takes this machine code — all binary ones and zeros, and translates it into "plain english" characters to be printed on your screen.

Your first encounter at "sending" that listing somewhere else probably came when you bought your printer. Assuming you have a VIC 1525 or equivalent, you quickly learned that the following statement would get you a printed listing:

```
OPEN 4,4:CMD 4:LIST
```

What you did was to open a file, in this case number 4, to device number 4, your printer, and then you commanded (CMD) the output of your computer to file number 4. After doing this you issued the LIST command and like magic the program was listed to your printer.

At the point where the computer does the actual listing, regular ASCII character codes are present. The mumbo jumbo of machine code lurks below the surface, but doesn't get in the way of reading the program listing. We've just found the simpler way!

FOUR TO ONE

Have you ever thought of your cassette recorder as a "screen"? Your computer has no trouble with that concept at all. In fact, you use that very concept when you have a sequential file to tape or disk. The following program statement can be used to create such a file on cassette:

```
OPEN 1,1,1,"FILE NAME":CMD 1:LIST
```

When that save has finished remember to clear the buffer by typing:

```
PRINT#1:CLOSE 1
```

You now need some modem software. Several such programs have been printed in *COMMANDER* over the past year (check TELECOMMANDER) or you may be the lucky owner of one of the fine commercial packages such as MBATEXT or HAMTEXT that allow not only ASCII transmission, but the ability to store files for later printing, saving, or retransmission.

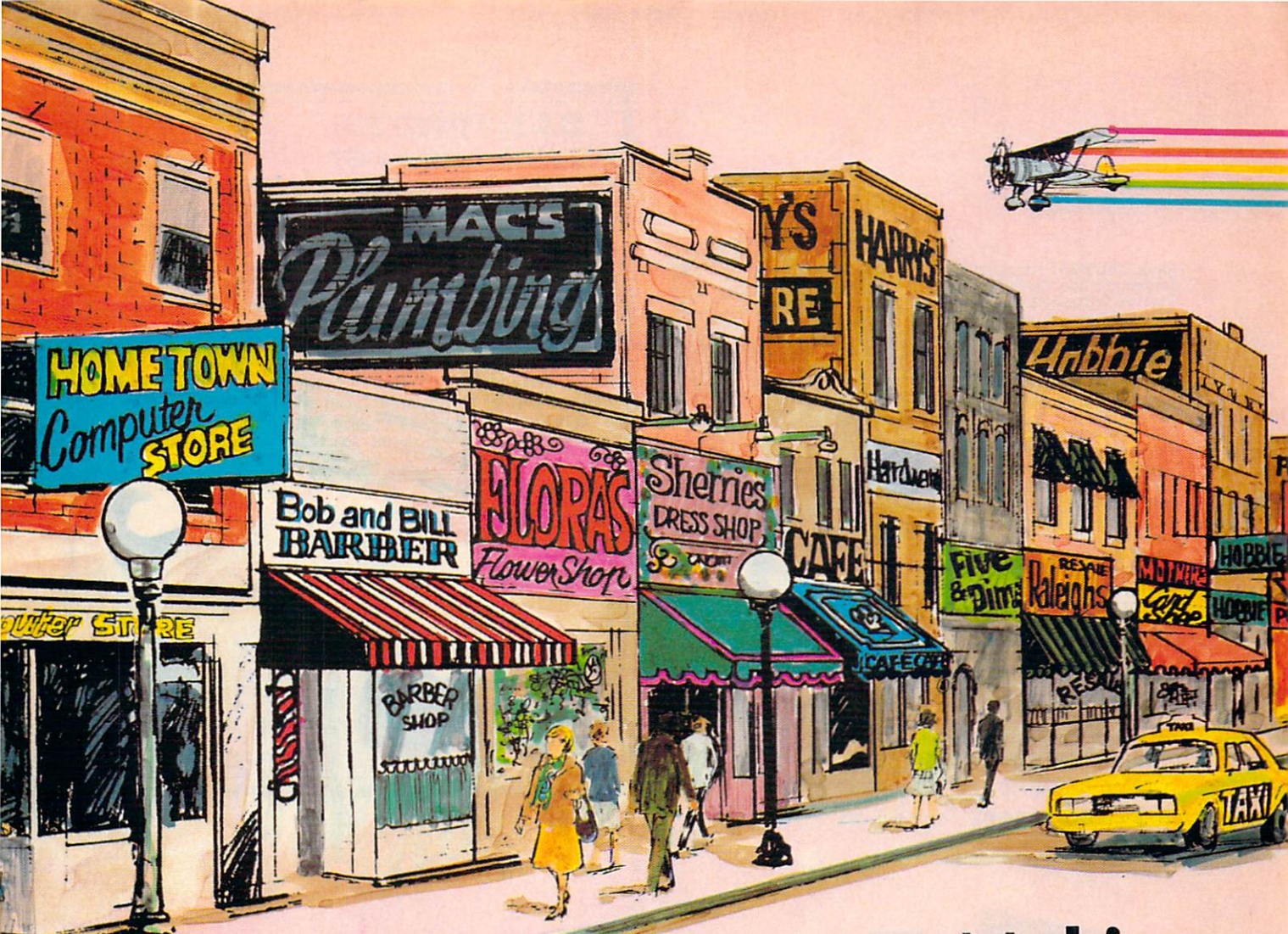
You send the program just like any text file. At this point that's all it is, just text.

BRIDGE TO CAPTAIN KIRK

As you are sending, the station on the other end hopefully is receiving and storing this ASCII file using his or her terminal software. After the file has been fully received, it must be saved to tape. What has to happen after the file has been received is to reconvert it into a program file rather than an ASCII sequential file. The program in figure 1 will do this job quite simply when using cassette.

In operation, the program first OPENs a receive channel to the cassette recorder. The POKE to decimal address 152 tells the computer there is one open file. You then start bringing in the program one ASCII character at a time and PRINT it on the screen. If the character is a "RETURN" we then "strong arm" a carriage return (ASCII value 13) into the keyboard buffer at decimal addresses 631 through 633. We also have to tell the computer there are three characters in the buffer and finally we send the program back to get another character.

If the character received is a blank line (ASCII code 10) then the file is CLOSEd and the "OK" prompt is printed. If all has gone well at this point, delete the lines above



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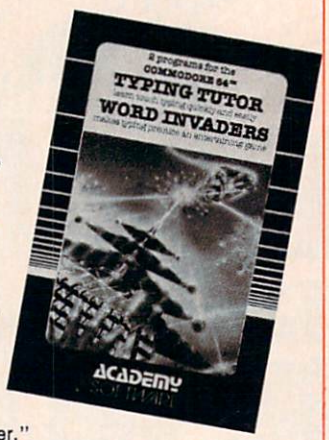

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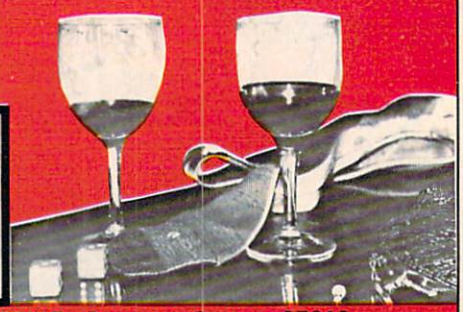

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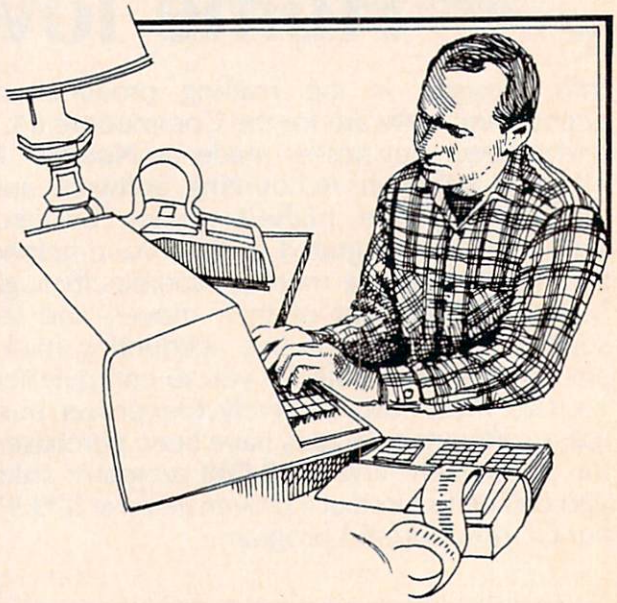

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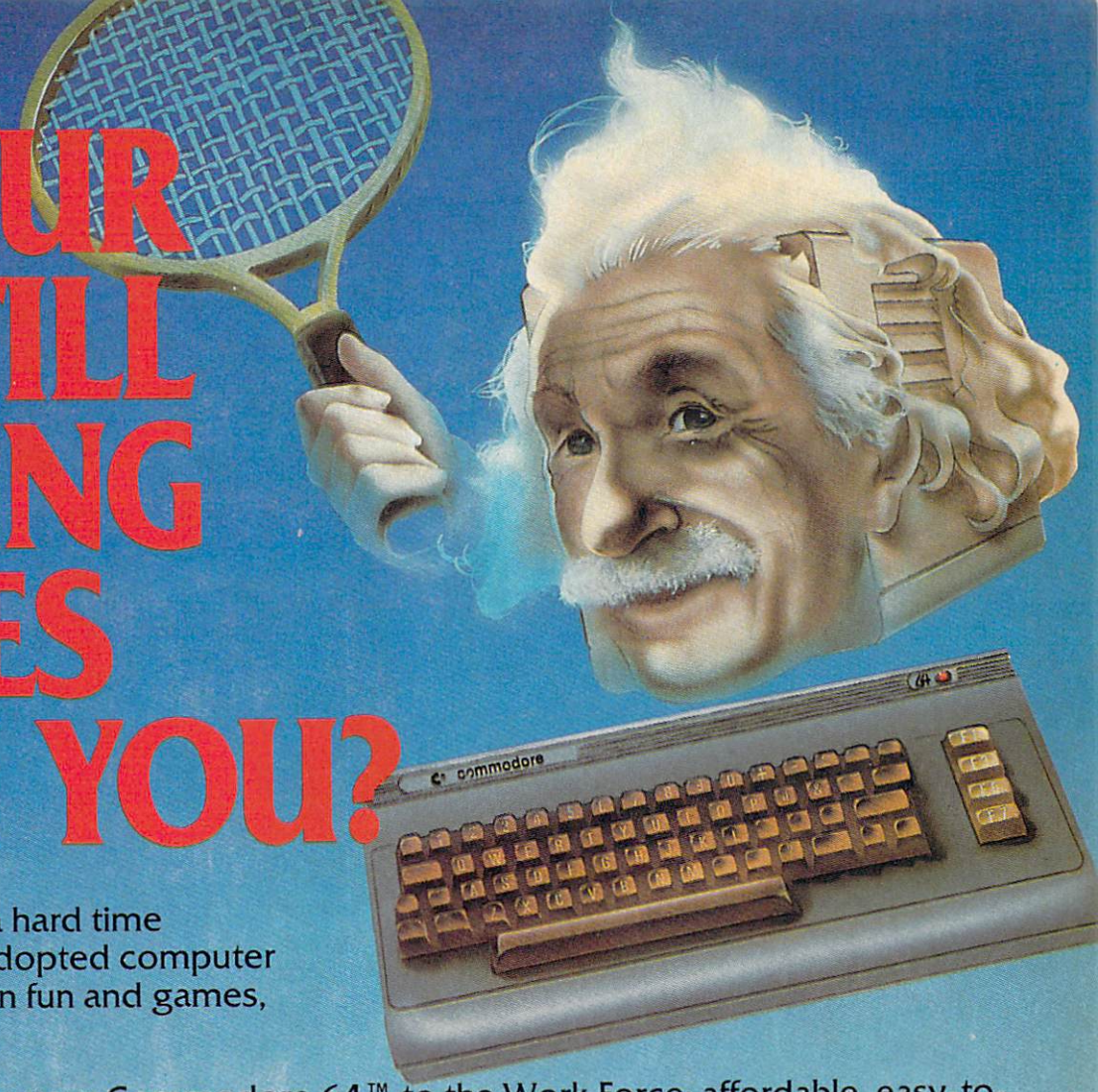

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63000 and what remains will be the program as originally sent, ready to run with no additional typing.

The reason for numbering the loader program with numbers in the 63000 range is that it is just below the maximum value allowed for line numbers in a BASIC program. In most cases this should keep the loader from interfering with the actual program. Almost all utility type programs are configured in this manner.

If you are without the necessary terminal software, you can still try the technique. Just create the file as described above and then try and reload it using the program in Figure one.

WORDS TO THE WISE

If the program you are trying to send contains ASCII characters with a value above 127, some translating may occur during transmission that will have to be corrected at the receiving end. Generally this only includes some graphics and the character colors. Certainly this is a small price to pay to save all that typing! The limitation is a result of many terminal programs (MBATEXT and HAMTEXT included) using seven bit ASCII. With seven bits, only 128 distinct combinations can be sent. Your Commodore computer uses eight bit ASCII which doubles the number of allowable codes to 256. Commodore gave us more, not less when they designed our machines.

I strongly recommend trying this technique out with a friend across town, preferably on a nice quiet VHF frequency. All data transmission is subject to errors introduced by fading signals, interference and so on. The same concept applies no matter what the communication path.

HAMS IN SPACE

Since 1982, fellow amateur and satellite enthusiast Bob Diersing, N5AHD has operated a bulletin board system for AMSAT, the Radio Amateur Satellite Corporation. AMSAT is the driving force behind the OSCAR satellite series. Bob has been supporting that program with computer compiled tracking data for many years. The AMSAT BBS provides a central point for amateur satellite enthusiasts with computers of any type to exchange ideas and questions. Information on the software available through the AMSAT software exchange is also included. A recent check-in revealed some very interesting information about Owen Garriot's successful amateur radio operation aboard the space shuttle. Incidentally, K9EI successfully used his VIC-20 and the AMS 2064 program to track STS-9. You should have heard the local QRM when I came on with the latest tracking information! Now if I can just get that coveted W5LFL/space mobile QSL card.

The phone number for the AMSAT BBS is (512) 852-8194. Bob, incidentally, comes by his computer "hobby" honestly. He is director of computer services, Corpus Christi State University. I do have to issue one warning. From my part of the country, the telephone circuits to Corpus Christi are nothing short of atrocious. I tried for several months with absolutely no success to access the AMSAT BBS using the VIC 1600 modem. The inexpensive circuitry in the 1600 can not adequately distinguish between the "white noise" generated in telephone company carrier circuits and the precious data tones it needs to accurately send and receive data. Commodore's official attitude is what do you expect for fifty bucks? In truth it is a good buy if you can count on a "full quieting" signal all the time. Commodore has still been reluctant to publish a schematic for the 1600 so we experimenters can try our hand at our own modifications. The solution? Read on . . .

FOR A FEW DOLLARS MORE

After a bit of hassling with a mail order company in the east that shall remain nameless I finally received the new improved, stronger than dirt, Automodem, model 1650. These things retail for about $150 though prices vary widely. Mine cost $79 with a bit of attendant aggravation. At $79 I would highly recommend it. The months of disappointment in trying to reach the AMSAT BBS came to an end the day the 1650 arrived! With it, I get about 95 percent accuracy with that BBS. I don't think anything but $750 worth of Bell modem or equivalent would take care of the remaining five percent of my problems. As I mentioned the carrier service to that area is absolutely miserable.

There are indications that the new 1650 has been manufactured under agreement with the Anchor Automation folks, makers of the Volksmodem. Seems like a good bet that the 1650 is the same unit in a somewhat different box.

The auto-answer feature is great and, of course, an absolute necessity for setting up your own BBS. I wasn't as impressed with the auto-dial capability. Predictably, dial pulsing is used rather than tone dialing. The software that comes with the modem, though written in machine code, seems extremely slow.

Commodore did their usual job on the documentation. Basic routines are included to add to your own terminal programs for auto answer and auto-dial. The auto answer routine detects the phone ringing quite nicely—it never does instruct the computer to "answer" the phone though! No information at all is included for disconnecting the line under computer control, though that too is a simple problem to solve. It is just very reminiscent of being told on page 16 of the disk operating manual that you have to NEW a disk before you use it! Enough about the 1650 here. Let the folks at *COMMANDER* know if you'd like to see an in depth look at this new piece of gear. I just happen to know someone they can get to write the article.

OFF TARGET

The listing for COMMAND POST RTTY TX in the April column contains a minor error. The problem only crops up if you merge the TX and RX programs as suggested. Line 450 contains a GOTO 430 statement. The line should have had a GOTO 450 statement. It doesn't do any harm in itself, but when you add the two programs together and delete line 430 just like I told you to you will encounter an error message. Sorry about that!

You may find it interesting to know that COMMAND POST has readers in West Germany, New Zealand and a few other places off the beaten track. If you have questions (pertaining to something printed in COMMAND POST) or suggestions (I love hearing your ideas for projects) send them to me: Jim Grubbs, K9EI, PO Box 3042, Springfield, Illinois 62708.

```
63000 PRINT""[clr]"":OPEN 1,1,0
63001 PRINT""[clr]"":PRINT:POKE 152,1
63002 GET#1,X$:IF ASC(X$)=10 THEN CLOSE 1:PRIN
      T""[down]OK"":END
63003 PRINT X$;:IF ASC(X$)=13 THEN 63005
63004 GOTO 63002
63005 POKE 631,13:POKE 632,13:POKE 633,13:POKE
       198,3:PRINT"GOTO[sp]63001[home]";
63006 REM COMMAND POST
63007 REM ASCII FILE
63008 REM LOADER
63009 REM JUNE 1984
63010 REM COMMANDER
63011 REM MAGAZINE
```

News, Views, Previews & Reviews

By Colin Thompson

When Commodore released the first 1540 drive, it carried an astounding $600 price tag. That seemed to me, at the time, to be an awful lot of money to satisfy my desire to upgrade my VIC. Well, I thought, it does have a built-in microprocessor, and it does store more data than any other single sided, single density disk drive on the market, and it doesn't need the computer's RAM memory to store its operating system, and most of all, I really do want it. All this rationalization cost me $600, and what I ended up with was the world's slowest disk drive that spends more time in the shop than on my desk.

Yet, with all its inherent problems, I was happy as a clam with the 1540 and its cousin, the 1541 because Commodore's disk drive was the only game in town. If you wanted a disk drive, you played by their rules: a slow serial bus, a cheaply made mechanical drive assembly and an incredibly complex series of commands and channels to open and close if anything was to be done with the drive. (Don't forget the poor excuse for a User Manual that is STILL, to this day, supplied with 1541s.)

Given all this, I can't understand why a Commodore-compatible disk drive, made by someone besides Commodore has taken so long to reach a market.

A few months ago I reported on the first 1541 compatible drive--the MSD Super Disk Drive. Since then, two other companies have announced their intentions to save us from the horrors of the 1541 with their own new drive. All I can say is "It's about time!"

WHO ARE THESE COMPANIES?

I reviewed MSD System's drive already, but if you missed it, I gave the SD-1 high marks in all categories except software compatibility. The second manufacturer to announce a drive is a veteran in the add-on drive business--Concorde Peripheral Systems. Their first product is a parallel single disk drive, designed for the C-64 only. I have one of the drives under review now. The third company is Laser Microsystems, but since I haven't seen their drive I can't tell you much about it. With all this competition in the disk drive market place, we now have the luxury of doing some comparison shopping.

TERMS OF ENDEARMENT

If you are going to be a smart shopper, you need to know the lingo before you part with any bucks. The newest buzzword in Commodorian drives is "parallel." In general, parallel means high speed. There are two ways to transfer data and programs to and from the disk drive: serial and parallel. The 1541 uses the serial bus method. Since railroading terms apply here, let's take a ride on the Reading.

"Bus" is nothing more than a copper wire connecting the drive and the computer. It's the cable. Think of it as a railroad track. Trains deliver their cargo--either freight or passengers--by traveling on the railroad track connecting two depots. Essentially, this mode of travel is point to point, and takes some time to complete the trip. Your computer uses a railroad track (the disk bus) to deliver it's cargo--data and programs--to the disk drive. Even though the cargo is delivered at electronic speeds, it still takes some time. You see that time when you LOAD a program and wait a few seconds or minutes before the computer says READY.

Commodore's serial bus is almost unique in the computer biz. Nearly every other brand of computer uses a parallel bus. Think of the serial bus as railroading in the steam era. It was slow, took a lot of time, but it worked.

THE BULLET TRAIN

A few years ago the Japanese took a different track. They decided that trains could be made faster and more comfortable if they applied some airliner technology. The result was called the "Bullet Train." It traveled very fast, was comfortable, and revolutionized the railroad industry. Disk drive technology has paralleled the railroad industry and now Commodore owners can take advantage of it. The parallel bus is here to stay. It is high speed (3-5 times faster), but with the advantage of speed comes a couple of drawbacks. I haven't mentioned just exactly how the parallel bus gets to be so fast. Remember the single copper wire that I likened to a train track? The parallel bus uses 8 copper wires to send and receive data. Eight Bullet Trains can deliver a lot of mail when compared to one chugging steam engine.

Technically, parallel operation is done by breaking up each byte into the eight bits that make up the byte and sending them to the drive simultaneously.

PROBLEMS IN RIVER CITY

The MSD drive can use either serial or parallel technology. The Concorde drive is strictly parallel. If you choose a parallel drive, some extra hardware is necessary to convert from a single path to a multipath bus. A cartridge must be plugged into the game port to make the conversion. A special cable connects the drive to the card to complete the path. Here's the first pitfall.

The C-64 was designed to operate with a serial bus disk drive. To use a parallel drive, the 64 must be fooled, electronically. This charade takes place in the parallel cartridge. The cartridge holds a series of programs that reprograms the 64's 'Kernal' or brain, tricking the 64 into thinking that a 1541 disk drive is attached to the computer when it is not. In plain terms, this chicanery can interfere with many commercial programs, thus preventing them from working. The 64's high order brain functions are scrambled, allowing the parallel disk drive to function, but not all of the programs you might wish to use. The current term for this mess is "software compatibility," although I prefer "software incompatibility."

The problem affects the Concorde drive to some degree. This is one of the reasons

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the drive has been a few months late in arriving. Not enough of the popular software packages will work with the drive. The MSD drive is immune to this kind of incompatibility when it uses the serial bus. To operate the MSD drive with a parallel bus, you must plug in an IEEE conversion cartridge. MSD makes one which I've found to be close to useless, but I hear they are upgrading it. The current version works with very little commercial software. Richvale makes a similar cartridge called the Buscard 2 which is reputed (I don't have one yet) to be more universally compatible. A third device called Interpod is also available, but is not completely compatible.

In theory, a parallel disk drive is highly desirable, but it should be compatible with your software or your investment is wasted.

SOFTWARE INCOMPATIBILITY, PART II

So far we've seen that parallel disk operation requires the 64's operating system to be drastically modified, thus preventing many programs from working. That's only half of the problem. All non-Commodore drives are equipped with Disk Operating Systems (DOS) that are close, but not an exact duplicate of the 1541 DOS. Commodore's DOS is copyrighted and may not be duplicated by other disk drive manufacturers. Therefore, to make a Commodore compatible drive, the DOS has to be rewritten to get around the copyright restrictions, but remain functionally similar, or the drive won't respond to standard disk commands. The DOS problem is what makes many programs fail to load from non-Commodore drives. Many commercial disk based programs are "Copy Protected." This protection prevents (in some cases) the programs from being copied by people who like to steal software without paying the authors for their work. The protection scheme most frequently used involves sending a small, machine language program to the disk's RAM memory and then executing it. These programs cause the drive to move the heads to a certain track, read some data to verify the diskette is not a bootleg copy, and then return control to the main program residing in the computer's memory. This is the heart of the problem. The authors fail to consider that the drive may not be made by Commodore. The commands sent to the non-Commodore drive may not be interpreted properly, due to the slight difference in the Disk Operating Systems or the disk's RAM layout.

HELP?

At first, the authors did not rewrite their protection schemes to include non-1541 drives because they felt they weren't losing much money. Now that MSD has captured a large share of the disk drive market, the authors (and distributors) are scrambling to make their products compatible with the new drives. For this reason (lost sales) I believe the compatibility issue will be mostly resolved by this summer. In the meantime, you will find isolated companies with software that won't load from the MSD and Concorde drives. The best way to find out if your proposed software purchase is going to RUN is to contact the software manufacturer or distributor and ask them. They will know. In general, the programs hardest hit by the compatibility problem are cartridge based programs that use the drive.

OUT ON A LIMB

From where I sit, I see some trends developing. The Commodore 64 is the most popular computer in an overcrowded marketplace. This popularity is attracting many talented software authors who previously plied their trade in the Apple and Radio Shack arena. I welcome their efforts and believe we can only benefit from the influx of their creativity. We should begin to see many more high quality programs that, in the past, would have been written for other computers. I would caution these newly arrived authors to learn about inconsistencies in the various Disk Operating Systems. Now we have a choice of disk drives, allowing us to tailor our hardware to our software needs.

My discussion (diatribe?) of the new disk drives--will continue next month, but now let's look at an exciting new disk alternative that has been a long time in arriving.

SUPER DISK—2 THE MSD DUAL DISK DRIVE

Talk about causing a stir! The day my new dual disk drive arrived, I called a couple of my friends to let them know the good news. Word got out fast that I had a drive that would back up a diskette in less than two minutes. From my experience, I can just about guarantee that a new dual drive owner will gain many new friends and acquaintances.

MSD Systems has delivered what they promised--a 4040 compatible, two disk drive. They call it the Super Disk 2. I call it heaven. I'm an amateur, BASIC language programmer. That means I program for fun and relaxation, like most computer owners who tinker with their toy. I sometimes think that we tinkerers keep the diskette manufacturers in business. My own library includes over 200 diskettes. As a 1541 owner, I learned to make backups of any diskette that I valued, but backing up a disk takes a lot of time and some sophisticated programming. To that end, I've collected more than 20 different disk copying programs to help with the dreaded chore. With the arrival of the SD-2, those days are gone for good.

SURE, BUT AT WHAT A PRICE?

A ticket to heaven, in this case, costs about $650. True, it sounds like a lot of money just to enjoy the luxury of fast backups, but now that we have a choice of disk drives, why not get the best available unit? This reasoning may not work for you, of course. Everyone has different reasons for owning a computer and cost is a factor with most of us. Still, with my six month experience with the SD-1, MSD's single drive, I recommend anyone who is looking for a drive, spend the extra $100 (over the cost of a 1541) and get the reliable MSD unit.

When I got the SD-2, I was expecting the same, highly reliable drive, and some software compatibility problems. I got both. The MSD drive has never failed me, except to LOAD and RUN a few commercial, copy protected programs. In my review of the SD-1 in December I noted a few of the companies that sold software which was not compatible. Since then, the list has shrunk. MSD has been working to overcome the problems by either changing their DOS or by helping software companies re-write their protection schemes.

LIFE WITH A DUAL DRIVE

I don't think most people really need a dual drive. A single drive should suffice for most home computing applications. It's prime purpose, as I see it, is to make copies of disks in less than two minutes. Small software companies and user group librarians could put the SD-2 to work and justify the cost. Software duplication on a small scale is already being done by some companies on the SD-2.

The other reason to own a dual is to simply use it with commercial software that makes use of a 4040 type drive. Most of this software was written for the Pet and some of it is transferable to the C-64 and VIC, without modification. You can buy the SD-2 and plug it in as you would an ordinary 1541 and begin using it immediately, or you can buy one of the IEEE cartridges mentioned earlier and then enjoy parallel operation. I've tried both MSD drives with an IEEE card and liked the

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results, though many commercial programs won't RUN.

INSIDE THE COVERS

Both the SD-1 and the SD-2 use the Tokyo Electronics Corporation mechanical drive units. The TEC drives offer better motor speed control, error correction and seek access times. The SD-2 is actually 16% faster than the SD-1 when moving the head from one track to the next. The head positioner is a split band, similar to the 1541. It uses a brushless, direct drive DC motor to spin the diskette. The TEC drive is, technologically, far superior to the Alps drive found in the 1541. Electronically, the SD-2 is similar to the SD-1 in that it uses a 6511Q microprocessor chip to control all disk activities. Even though the 4040 uses two microprocessor chips, the SD-2 seems to operate just as fast.

Although the SD-2 has two drives, it does not behave like two 1541s hooked up as devices 8 & 9. Instead, it responds as device 8 with two Units: zero and one. For example, if you enter this:

```
LOAD"PROGNAME",8
```

both drives will be searched for PROGNAME and, if found, it will be LOADed. If you ask for the directory, both will be returned. You may also specify which unit is to be used like this:

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SAVE"Ø:DATAFILE",8

Notice that both examples call on device 8, but the SAVE command specifies the left drive (Ø).

The SD-2 works with all file types and is command-compatible with the 4040. One new command is available that 1541 owners don't have: Duplicate. This is the command that copies (duplicates) the contents of one diskette to another in one minute and fifty-five seconds. The copy is an exact duplicate of the master, including disk name and ID. Special software is not needed to duplicate a disk. The SD-2 recognizes the dupe command when you send it from the immediate mode or from within a BASIC program. The command looks like this:

```
OPEN 15,8,15
PRINT#15,"DØ=1"
```

That's all there is. In less than two minutes the blank diskette in drive Ø will be formatted and become an exact duplicate of the diskette in drive 1. You may also Copy a single file from one drive to the other with a similar command. A blank diskette will be formatted in only 17 seconds.

IS IT REALLY WORTH THE PRICE?

I'll leave that decision to you, but I fell in love with it, compatibility problems and all. I get around most of this compatibility mess by adding a 1541 as device 9. When I want to load a severely protected program, I just use the 1541 to get it into the computer. This trick works with the SD-1 also. The SD-2 will read from and write to any disk that was generated on a 4040 or 1541. My SD-2, although a production model, came with a pre-production user manual. The manual is not typeset or pretty, but it does provide an education in disk operation. Every disk command is clearly explained, in English, with programming examples for each. MSD offers a 180 day warranty and technical assistance by telephone.

For more information, call MSD Systems, (214) 357-4434.

TWO VIC BOOKS

I dearly wish I had access to "The Vic 20 Starter Book" when I first bought my VIC. The new book (1984) has just been released by Sams. It is written in the style of a textbook and is well thought out. Every aspect of the VIC is explained and each chapter ends with a quiz. This book could have saved me much grief and lost sleep two years ago. I give it my highest recommendation. Its 350 pages are well worth the $15.95. Written by J.A. Titus, C.A. Titus and D.G. Larsen.

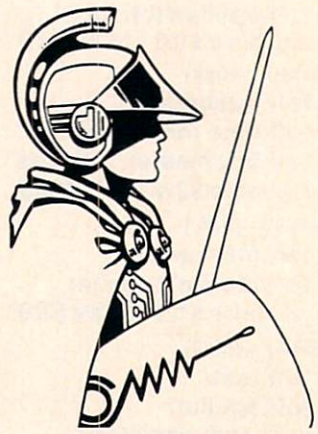
Did you buy a VIC and now wonder what to do with it? Don't put it in closet! Pick up a copy of Thomas Blackadar's new book "The Best of VIC 20 Software." In the book, published by Sybex, Tom reviews 19 programs written for the VIC. About half are games with the rest split between music, education and home management. The first 15 pages present a lucid explanation of the abilities of the VIC. This is a good book for VIC novices. 175 pages, price is not known.

THE COMAL CONNECTION

A few months ago I received a public domain version of COMAL. The demo disk had me jumping for joy and looking for more information about this fantastic new programming language. I'm still not up to speed on COMAL, but I can at least recommend a couple books that are "must" reading. The first book to buy is "Structured Programming With COMAL" by Roy Atherton. This is a textbook which explains how to write programs in COMAL. I was lost until I got this book. I purchased my copy for $24 from B. Dalton Booksellers. You may have to special order it. It's published by John Wiley & Sons.

The next book to get is "The COMAL Handbook" written by Len Lindsay. This book explains how COMAL is used on the C-64. The $19 book is available from the COMAL Users Group, 5501 Groveland Terrace, Madison, WI 5l3716. (608) 222-4432.

I should have known! I looked for Simon's BASIC for months and now that I have it, the cartridge sits on a shelf, unused. COMAL seems to be a much better alternative to BASIC and assembly language.



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Southern Solutions Accounting System III (Per/Module)	$ 285.00
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BUSINESS SOFTWARE — B128-80

Superscript II	Call
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HOW TO TYPE IN BASIC PROGRAMS FROM *COMMANDER* MAGAZINE

As you probably know, your computer has a limited vocabulary and responds to BASIC language instructions in an extremely literal way. Programs listed in *COMMANDER* are carefully pretested, and should run as intended on your computer if they are copied properly. The following guidelines should help to clarify some important points about entering programs through the keyboard.

WRAP AROUND

Every "line" in a BASIC program begins with a line number and ends when you press the [RETURN] key. If a line in the program contains more characters and spaces than can fit on the width of your screen, just keep typing and the computer will automatically continue on the next row of the screen. You should press [RETURN] *only once* before starting the next line number. A 40-column C-64 or PET will "wrap-around" a program line for no more than 2 screen rows, with a maximum of 80 characters per program line. The 22 column VIC-20 can wrap around up to 4 rows (88 characters) in a program line.

SPACES

In a BASIC statement, spaces are usually ignored by the computer but may be added by programmers to increase readability. However, when the "quote mode" is in effect (see below), spaces do count. Unless you have good reason to do otherwise, it is probably safest to type spaces as they appear in our listing. Please note, however, that wrap-around lines will *not* be indented on your screen the way they appear in our published listing.

PUNCTUATION

Pay careful attention to punctuation symbols. You may not think there's much difference between a colon and a semicolon, but the computer certainly does. All commas, parentheses, and other special characters should be faithfully copied.

PLEASE NOTE: For technical reasons, quotation marks are listed as a double apostrophe. When you see that, press [Shift-2] for the quotation mark symbol.

ONES AND ZEROS

Among the most common errors of beginners (and even experts) is confusing the numbers 1 and Ø with the letters I, L, and O. You may have learned to type a lower case L for 1 on a typewriter, but most computers will not allow it. In our listings, pay close attention to the shape differences between the numbers 1 and Ø and the similar letters, I and 0.

SAVE IT WHEN YOU CAN

It is wise to SAVE a program on tape or disk before running it. That way, if the computer "locks up" or becomes inoperative because of an error, you won't have to re-type everything. For a very long program, it is advisable to save what you have entered after every 20 or 30 minutes of typing.

THE "QUOTE MODE"

Most Commodore computers incorporate an extremely useful, though tricky, feature called the Quote Mode. This allows you to program screen control functions, including cursor movement and character color changes, within a PRINT statement. Quote Mode is turned on whenever the quotation mark key [shift-2] is pressed. It is turned off when the quotation mark key is pressed again, or when the [RETURN] key is pressed. Quote mode is also in effect whenever the insert (INST) function is used.

When the quote mode is *on*, any time you press either a cursor control key, a color control key (such as [ctrl-wht]), or a reverse control key, you will see an inversed graphic character appear on your screen. These characters have no obvious meaning by themselves except as indicators that certain control functions have been inserted in the program. These inverse graphic characters also appear in normal, hard-copy (paper) listings of a program, but are nearly impossible to interpret in that form.

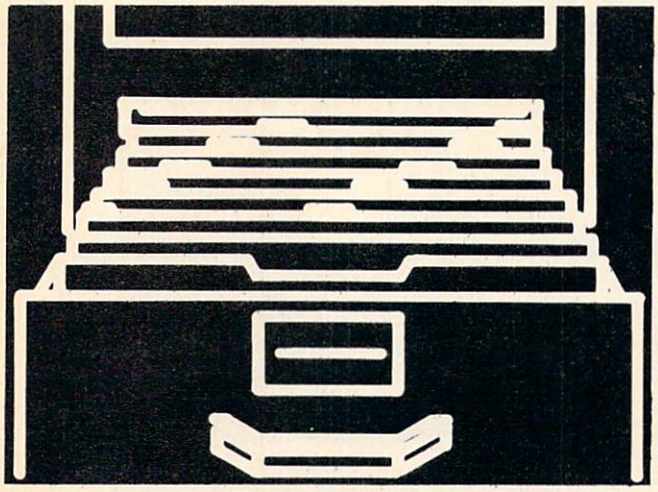
THE *COMMANDER* "QUOTE MODE" LISTING FORMAT

To make your task as easy as possible, *COMMANDER* has adopted a unique format for all control and graphic characters, as well as spaces, that occur between quotation marks. In our listing, each special character is represented by an abbreviation that appears between a pair of square brackets. For example, [down] means to press the cursor-down key once. The abbreviation [com-G] means to hold down the Commodore logo key (at the far lower right of the keyboard) while pressing G. When you see [shf-W], hold the shift key and press W. The space bar is indicated by the symbol [sp]. When the same special key is to be pressed more than once, the number of repeats will be shown between the brackets, for example, [right, 8 times].

Here is a list of the most common special key abbreviations:

Abbreviation	Key(s) to Press
[blk]	CTRL & 1
[wht]	CTRL & 2
[red]	CTRL & 3
[cyn]	CTRL & 4
[pur]	CTRL & 5
[grn]	CTRL & 6
[blu]	CTRL & 7
[yel]	CTRL & 8
[rvs-on]	CTRL & 9
[rvs-off]	CTRL & Ø
[clr]	SHIFT & CLR/Home
[home]	CLR/HOME
[inst]	SHIFT & INST/DEL
[down]	CRSR ↓
[up]	SHIFT & CRSR ↓
[right]	CRSR →
[left]	SHIFT & CRSR →
[shf-X]	SHIFT & X(or any key indicated)
[com-X]	Commodore (lower right key) & X (or any key indicated)

Software that has the Edge.



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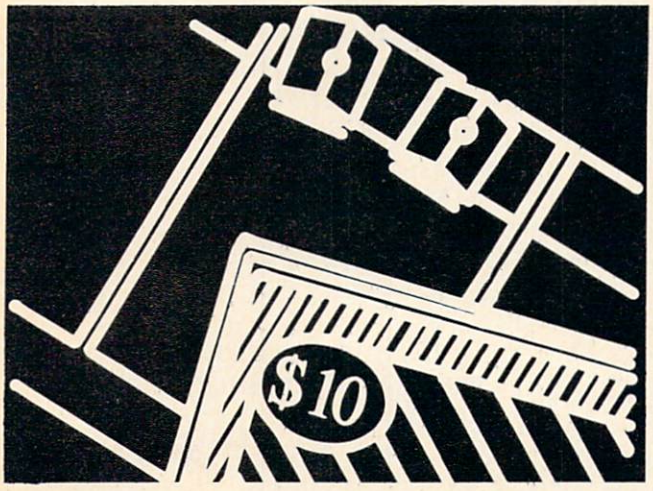

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Apple Pick'n

by Robert L. Bloomer

In playing "Apple Pick'n" you are a member of a poor starving tribe. The evil Hothian Fuzz monsters have stolen the only food in the land, the "magic apples." They have taken them underground to their labyrinth.

There are many dangers in the labyrinth. First there are the evil Fuzz monsters. They have radar and know where you are. Second there are rocks. You can walk under them for only a brief moment. If you don't get out of the way in time, you may be crushed. The next danger is fighting against the clock. You must get the apples before you starve. The last danger you encounter are the gates to the storage chamber. They are constantly opening and closing. If you get caught in one of the gates as it closes, it proves to be a fatal move.

"Apple Pick'n" is made up of two programs. The first program loads the custom graphics and the machine code. It will automatically load and run the second program.

Your man is controlled by the joystick. To start, move down out of the mountain. Each apple is worth 50 points. Once all the apples are gathered you move onto the next level. Incidentally, when the program has been loaded, press stop on the play button or your joystick will not respond properly.

In the first program lines 3-5 read the graphics, lines 6-7 read the machine code, lines 9-28 are the DATA statements, line 34 loads and runs the second program.

In the second program, line 3 reads the machine language sound routine. Lines 5-13 contain the DATA statements for the sound routine. Lines 14-17 initialize the variables. Lines 18-30 draw the screen. Line 34 reads the joystick. Line 39 moves the tribesman. Lines 40-45 contain the rock falling routine. Lines 50-60 contain the Fuzz monsters movement routine. Lines 62-68 contain the death routines. Lines 69-75 control the levels.

LIST OF VARIABLES

M(@)-M (2)-Fuzz monsters location
SC-Score.
LV-Level.
D-Rock location.
M-Tribesman's location.
DM-Number of apples.
F3-Difference from the tribesman and Fuzz monster.
J-Reading from the joystick.

Listing 1

```
1 X=PEEK(56)-2:POKE52,X:POKE56,X:POKE51,PEE
  K(55):CLR:PRINT''[clr]''
2 POKE36879,110:POKE36869,255:POKE36878,15
3 FORA=7423TO7431:POKEA,0:NEXT
4 FORA=7168TO7175:POKEA,255:NEXT
5 FORA=7176TO7271:READB:POKEA,B:NEXT
6 FORA=7300TO7338:READB:POKEA,B:NEXT
7 FORA=7500TO7666:READB:POKEA,B:NEXT
9 DATA60,24,60,90,153,60,36,102
10 DATA24,60,62,126,126,124,60,8
11 DATA255,255,255,255,255,255,255,255
12 DATA68,170,56,84,124,124,40,68
13 DATA255,248,224,192,192,128,128,128
14 DATA255,31,7,3,3,1,1,1
15 DATA128,128,128,192,192,224,248,255
16 DATA1,1,1,3,3,7,31,255,14,16,126,251,247
  ,255,126,60
17 DATA230,40,124,146,182,254,40,238,66,165
  ,60,90,126,102,90,195
18 DATA195,231,195,165,102,195,219,153
19 DATA162,12,173,255,29,201,4,240,20,201,3
  ,240,9,201,2,240,1,96,142,88,30,96,142,8
  8,30
20 DATA142,89,30,96,142,88,30,142,89,30,142
  ,90,30,96
21 DATA172,254,29,174,253,29,224,10,240,3,7
  6,101,29,162,,200,192,2,240,3,76,101,29,
  160,
22 DATA192,1,240,25,232,173,147,31,201,1,24
  0,42,169,3,141,147,31,169,160,141,154,31
  ,142
23 DATA253,29,140,254,29,96,232,173,154,31,
  201,1,240,17,169,3,141,154,31,169,160,14
  1,147
24 DATA31,142,253,29,140,254,29,96,169,1,14
  1,252,29,96,169,3
```

TWO EXCITING NEW PRODUCTS FOR THE COMMODORE-64

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P Technologies

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```
25 DATA162,,157,228,31,232,224
   ,23,208,248,169,7,162,,157,
   228,151,232,224,23,208,248,
   96
26 DATA169,127,141,34,145,173,
   31,145,201,122,208,6,169,,1
   41,251,29,96,201,118,208
27 DATA6,169,44,141,251,29,96,
   201,110,208,6,169,21,141,25
   1,29,96,173,32,145,201,119,
   208
28 DATA6,169,23,141,251,29,96,
   169,22,141,251,29,96
31 PRINT''[clr]''
32 PRINT''[down, 3 times][righ
   t, 5 times][rvs-on][wht]A[c
   yn]P[yel]P[wht]L[cyn]E[righ
   t][yel]P[wht]I[cyn]C[yel]K[
   wht]'[cyn]N''
33 PRINT''[rvs-on][right, 7 ti
   mes][down, 3 times]LOADING[
   blu][up, 2 times]''
34 POKE198,5:POKE634,13:POKE63
   5,131:END
```

Listing 2

```
 1 POKE37154,255:P=30720
 2 SN=36875:POKESN-6,255:POKES
   N+3,15:POKESN+4,27:DIMM(3):
   P=30720
 3 FORI=830TO974:READC:POKEI,C
   :NEXT
 4 SYS830
 5 DATA120,169,5,141,60,3,169,
   6,141,61,3,169,133,133,,169
   ,3,133,1,169,93,141
 6 DATA20,3,169,3,141,21,3,88,
   96
 7 DATA206,61,3,208,28,72,152,
   72,172,60,3,200,177,,141,61
   ,3,200,177,,201
 8 DATA1,240,12,141,12,144,140
   ,60,3,104,168,104,76,191,23
   4,160,255,208,243
 9 DATA10,201,10,203,10,207,20
   ,225,10,207,20,225,20,207
10 DATA30,225,10,225,10,228,10
   ,229,10,231,10,225,10,228,2
   0,231
11 DATA10,223,20,228,40,225
12 DATA10,201,10,203,10,207,20
   ,225,10,207,20,225,20,207,3
   0,225,10,219,10,215
13 DATA10,212,10,219,10,225,20
   ,231,10,228,10,225,10,219,4
   0,228,1,1
14 SC=.:LV=1:POKE7679,3:A$=''0
   00059'':D=.
15 POKE7507,10
16 M=7794:DM=.:M(0)=7991:M(1)=
   7955:M(2)=7984:POKE7676,0:P
   OKE7677,0:POKE7678,0:D=.:Q=
   .
17 TI$=''000000''
18 PRINT''[clr][blu]@@@@@@@@@@
   @@@@@@@@@@@@@@@@@@@@@@@@[rvs-o
   n][shf-\][com-*][rvs-off]@@
   @@@@@@@@@@''
19 PRINT''[up]@@@@@@[rvs-on][s
   hf-\][com-*][shf-\][sp, 2 t
   imes][com-*][rvs-off]@@@@@E
   F@@@@@@@@[rvs-on][shf-\][sp
   , 6 times][com-*][rvs-off]@
   @@@GH@@@''
20 PRINT''[up]@@@@[rvs-on][shf
   -\][sp, 8 times][com-*][shf
   -\][com-*][rvs-off]@@@@@@@@
   @[rvs-on][shf-\][sp, 12 tim
   es][com-*][rvs-off]@@@@@''
21 PRINT''[yel][up]C@@@@@@@@@@
   @@@@@@@@@@@CC@@@[blk]B[yel]@
   @@@@@@@@@[blk]B[yel]@@@@@C''
22 PRINT''[up]C@@@@@@@@@[blk]B[
   yel]@@@@@@@@@@@@CC@@@@@@@@@@
   @@@[blk]B[yel]@@@@@@C''
23 PRINT''[up]C@@[blk]B[yel]@@
   @@@@@@@@@@@@[blk]B[yel]@@C''
24 PRINT''[up]C@@[grn]I[yel]@@
   @[blk]B[yel]@@@@@@[blk]B[ye
   l]@@@[grn]I[yel]@@CC@@[rvs-
   on][sp][rvs-off]@@@[grn]I[y
   el][rvs-on][sp, 6 times][rv
   s-off][grn]I[yel]@@@[rvs-on
   ][sp][rvs-off]@@C''
25 PRINT''[up]C@@[rvs-on][sp][
   rvs-off]@@@@@@@[blk]B[yel]@
   @@@@@[rvs-on][sp][rvs-off]@
   @CC@@[rvs-on][sp][rvs-off]@
   @@@@@@@@@@@@@[rvs-on][sp][r
   vs-off]@@C''
26 PRINT''[up]C@@[rvs-on][sp,
   16 times][rvs-off]@@CC@@[gr
   n]I[yel]@@@[blk]CCCCCCCC[ye
   l]@@@[grn]I[yel]@@C''
27 PRINT''[up]C@@@@@[blk]B[blk
   ]C[grn]I[yel][rvs-on][sp, 4
    times][rvs-off][grn]I[blk]
   CB[yel]@@@@@CC[grn]I[yel]@
   @@@@[rvs-on][blk][sp][yel][
   sp, 6 times][blk][sp][yel][
   rvs-off]@@@@@[grn]I[yel]C''
28 PRINT''[up]C@@@@@[blk]B[blk
   ]C[grn]I[yel][rvs-on][sp, 4
    times][rvs-off][grn]I[blk]
   CB[yel]@@@@@CC@@@@@@[blk]C
   CCCCCCCC[yel][rvs-off]@@@@@@
   CC@@@@[grn]I[yel]@@@@@@@@@@
   @[grn]I[yel]@@@
```

```
29 POKE8163,3:POKE38883,7
30 SYS7585
31 SYS7300:SYS7500:IFPEEK(7676
   )THENPOKEM,12:GOTO62
32 PRINT''[blu][home][right][r
   vs-on]TIME:''RIGHT$(TI$,2)''
   [right, 3 times]SCORE:''SC''
   [home][down][right][rvs-on]
   LVL:''LV;''[rvs-on][left][
   sp]''
33 IFTI$=A$THEN62
34 SYS7610:J=PEEK(7675)-22
35 IFM+J<7812ORPEEK(M+J)=30RPE
   EK(M+J)=2THENJ=.
36 IFPEEK(M+J)=9THENDM=DM+1:SC
   =SC+50:POKESN,240:POKESN,0:
   IFSC=2000THENPOKE7679,PEEK(
   7679)+1
37 IFDM=14THEN69
38 IFJTHENPOKESN,220:POKESN,0
39 M=M+J:POKEM-J,160:POKEM,1:P
   OKEM+P,0
40 XX=240:IFPEEK(M-22)=2THENQ=
   Q+1:D=M
41 IFPEEK(D)=160THENPOKED-22,1
   60:POKED,2:POKED+P,0:D=D+22
42 IFPEEK(D)=160THENPOKESN,XX:
   XX=XX-5:GOTO41
43 POKESN,0
44 IFQ=2ANDM=DTHENPOKEM-22,160
   :POKEM,2:GOTO62
45 IFPEEK(M-22)<>2THENQ=.:D=.
50 FORZ=0TO2
51 POKE887,144:POKESN,0
52 F2=M(Z):F3=(M-F2)
53 IFF3<-22THENF4=-22
54 IFF3>22THENF4=22
55 IFF3<10ANDF3>0THENF4=1
56 IFF3>-10ANDF3<0THENF4=-1
57 IFPEEK(F2+F4)=1THENPOKEF2,1
   60:POKEF2+F4,10:POKEM(Z)+F4
   +P,4:GOTO62
58 IFPEEK(F2+F4)<>160THEN60
59 POKEM(Z),160:POKEM(Z)+F4,10
   :M(Z)=M(Z)+F4:POKEM(Z)+P,4
60 POKEM(Z),10:POKEM(Z)+P,4:NE
   XT
61 GOTO31
62 PRINT''[down][right, 5 time
   s][rvs-on]YOU[sp]DIED''
63 POKESN+3,0:FORA=1TO2000:NEX
   T
64 POKE7676,0
65 POKE7679,PEEK(7679)-1:IFPEE
   K(7679)THENPOKESN+3,15:GOTO
   16
66 PRINT''[home][rvs-on][down,
    7 times][right, 7 times]GA
   ME[sp]OVER[right, 10 times]
   [rvs-on]PUSH[sp]F1[sp]TO[s
   p]START'':POKESN+3,0
67 GETA$:IFA$<>''''THEN67
```

Continued on page 93

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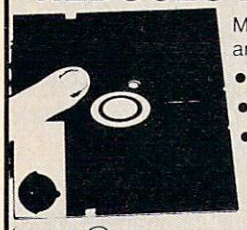

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The Newsletter Editor

by Colin F. Thompson

The "Newsletter Editor" (NED) started as a small programming project to accomplish a very limited goal. That goal was to be able to read disk text files written on any word processor without using the word processing program that generated the text.

As the assistant newsletter editor for my local Commodore Computer Group, my duty is to print each month's articles (from many different authors) on my Dynax DX15 printer and make the copy available to the Editor for final pasteup. At first it sounded like a simple task, so I accepted the job with a clear mind and the innocence of the uninitiated.

I soon discovered why I was asked to do this job. I thought it was because I have the best printer in the club. Wrong. I got the job because I have the most word processing programs.

Each month now, I receive articles on disk, written on as many as six different word processors. I can't ask all the authors to switch to Quick Brown Fox just because I favor it, so in self defense I wrote NED.

SCOPE OF THE PROGRAM

The Newsletter Editor was designed as a tool for newsletter Editors, but anyone who needs to extract information from disk files may find it useful. The program does not edit text, but rather pulls text from the disk, displays it on the screen and prints it on the printer. Text from the eight most popular word processing programs may be captured. Acutally, most word processor files are accessable. Figure 1 is a screen dump of the Main Selection Screen for the C-64 version. This is what you will see when you RUN the program. NED will work on the C-64 and VIC 20 with 8K of additional RAM added.

While investigating the various word processors on the market, I found that they all store their text files on the disk in one of three formats: SEQuential, USER, or PRoGram files. Within each of these three formats the text may be stored in any of three coding schemes: PET ASCII, ASCII or Screen Codes. To make a truly universal text reader, all the storage options must be considered. Since I don't expect you to know that QBF is stored as a 7 bit ASCII PRoGram file or that Word Manager is a PET ASCII USER file, etc., I've labeled the main menu with the actual names of various word processors. This will take most of the guesswork out of your hands.

WHO CAN USE THE PROGRAM?

NED was written under the assumption that you, the Editor, don't own all the word processors ever written. I also assume you receive material in a format you can't cope with, unless the author uses the same word processor that you use. It is assumed you have a parallel or VIC printer.

HOW TO USE THE PROGRAM

LOAD and RUN "editor". The main screen (fig. 1) has 13 menu options. The first nine allow you to select which "brand" of text file you will be working with. Option 10 will exit the program and begin listing NED to the screen. Option 11 will change the cursor color. Options 12 and 13 are for the C-64 only and will not appear for VIC 20 users. They change the screen and border colors.

```
THE NEWSLETTER EDITOR
by  Colin F. Thompson

Read a File From
Which Word Processor?

1.  Quick Brown Fox
2.  Word Manager
3.  SpeedScript
4.  Totl.Text
5.  Paper Clip CTL Z
6.  Paper Clip CTL S
7.  EasyScript
8.  WordPro 3+
9.  WES / Page Mate

10. Exit Program
11. Cursor Color
12. Screen Color
13. Border Color

Which Number? 1
```

Insert the diskette with the text file to be read into drive 8 (or 0:) and select an option between 1 and 9 to match the file type. The screen will change to resemble figure 2. The "brand" will appear in the upper left hand corner. The prompts "Press p or q" remind you that you may pause the text any time or quit and return to the main menu.

"Print the text y/n/q" gives you three options. Answering "q" will return you to the main menu. "y" will cause the text to be sent to both the screen and printer. "n" will only list the text to the screen for viewing.

If you select "y" the next prompt will ask "CBM Printer y/n". Answer "y" if you have a VIC 1525 or if your printer interface converts PET ASCII to ASCII or if the interface emulates the 1525. Most dot matrix printers will work if you answer "y". Always try to use the "y" option. This will print the text in the proper "case" on the screen. If the printed text is reversed, (uPPER AND lOWER CASE) you may do two things to correct it.

The better method requires you to read your printer manual or interface manual and find which switch controls the "7 bit or 8 bit" option. Changing this switch will correct the problem. The other method is to answer the question with an "n". This will do the conversion but is not guaranteed to work with every printer. Also the case will be reversed on the screen. Try to let the printer or interface do the ASCII conversion for you.

At this point the program asks for the filename. Enter it exactly as it appears on the disk's directory. The only exception is QBF. Reverse the case. Usually this means entering the file name in lower case even though the directory shows it in upper case. If everything goes well, the screen will clear and you will see a flash in the upper left part of the screen. Text will start filling the screen, one character at a time. If you selected the printer also, it will begin printing the text one line at a time. This will

continue until the End Of File is reached, or you press "q" or "p". If a disk error is encountered, the disk status will appear on the screen, telling you what the problem is, and the run will terminate.

FORMATTED TEXT?

Many word processors embed some formatting codes into the body of the text. I didn't really want these codes to appear on the screen or printer so NED will strip out these unwanted codes from some of the brands. In particular, QBF and TOTL.TEXT use a lot of formatting codes, but none will appear. This will be discussed in detail later. You have some control over the printed output. You can select the right margin. If your newsletter's format is 40 columns wide, for example, you can print the text with a right margin of 40. Words will not be broken up. Only whole words will be printed on each line. Right justification is not done, but could be implemented, as most of the code necessary is already in place.

It would be a good idea to provide your authors with a copy of NED so they may read their text files with it and see how it looks before submitting it. In general, the text files should be written with no format codes embedded. It is best if the only non-text character in the text is a carriage return. More on this later.

PROGRAMMING NOTES AND DESCRIPTION

NED is written in BASIC. A glance at the listing will show the program has 9 major modules. Since there are many possible combinations of file types, the conversion routines are handled in one of four modules: QBF, Word Manager (WM), SpeedScript and Seq File Reader.

Each of these modules performs similar tasks, but works on different file structures.

PROGRAM FLOW

No matter what brand of text file is to be read, the flowchart of the program reads about the same with only minor variations. After the user-supplied variables are input, NED branches to the module that handles that brand. A read file is opened to the disk, using the file name supplied. Status is checked and if the file name was found, NED continues. If any problem occurs with the disk channel, status will be printed on the screen for 2 seconds and then second screen will appear so you can start over.

If status is OK the text is read in using a GET# statement. Yes, this is slow, but it allows each character to be examined. Conversion from Screen Code or ASCII is done and the character is examined again (in some modules) to see if it is part of an

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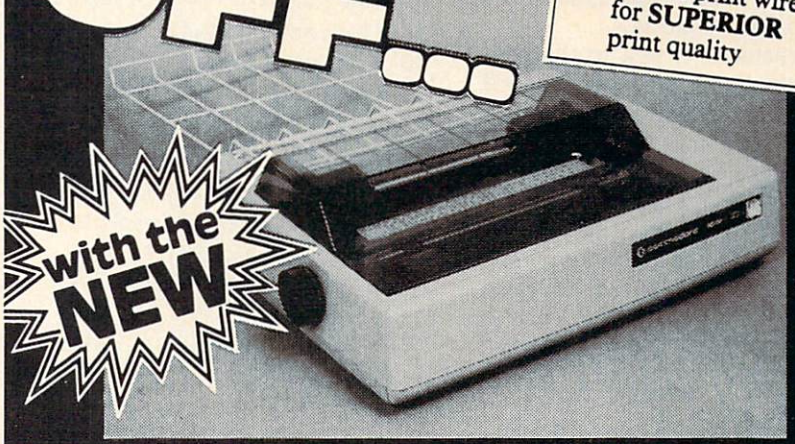

COMMODORE 1526 PRINTER!

Actual Print Sample
THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG.
the quick brown fox jumped over the lazy dog.

Print Method: Serial Impact Dot Matrix

Print Speed: 80 CPS

Print Direction: Bi-directional (logic seeking) in text mode; uni-directional in bit image graphics mode

PRINT CHARACTERISTICS

Format:
- Alphanumeric—9x8 full space character matrix
- Block character graphics—7x8 dot matrix
- Bit image graphic—Vertical 7 or 8 dots

Character Set:
- 228 ASCII characters—normal and alphanumeric fonts, symbols and semi-graphics

Dot Graphics Density:
- Normal—640 dots/203.2 mm (8 in) line
- Horizontal compressed—1,280 dots/208.2 (8 in) line

Graphic Resolution:
- Single mode—80Hx82V DPI
- Double mode—160Hx82V DPI

Print Styles:
- Pica, pica bold and emphasized

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unwanted format code. If it is, the code is discarded or acted upon. Characters are then sent to a subroutine that determines if the text is to be viewed only or printed. If it is to be printed on an ASCII printer ("n"), it is converted to ASCII. Text to be printed then goes into a string (ps$) and held until the CHR$)13) (return) is received or the string is as long as the right margin. When the second condition is met, ps$ is searched from right to left for a space character (32). When a 32 is found, all the text to the left of it is printed. The text to the right of it is kept as a new ps$ and the building process starts anew. This is how the text is printed without breaking up the words. You may set the right margin in Line 1 (rm = ??). If a return is encountered before ps$ is full, ps$ is printed as is.

After a character is sent to the print routine, the keyboard is examined to see if a "q" or "p" has been pressed. If not, the system status is examined to check for the End Of File condition. If it is found or if "q" was pressed, control is passed to the Disk Status Module where the status is read from the drive and printed on the screen. All open files are closed and the Main Menu appears.

DETAILS

There is no truly "universal" file reader. The scope of NED is limited to the major brands of word processors. If you run into a word processor that is not listed on the Main Menu, the chances are good that you may recover its text by using a little detective work. First look at the directory and find out what file type the text is stored under. PRG, USER and SEQ are handled by NED. Once you know the file type, select the menu option that handles that type. QBF does PRG files with ASCII. Word Manager does USER files with PET ASCII. SpeedScript does PRG files with Screen Codes. The rest use SEQ files with PET ASCII. Try reading the foregin text file from the option that handles that file structure. You WILL get something. Now let's examine each of the four major modules.

QUICK BROWN FOX

QBF needs one small routine the others do not. When you enter a file name, the file name must be converted to true ASCII in the subroutine beginning at Line 380. QBF's embedded format codes all begin with the # symbol. Incoming characters are examined in the routine beginning at line 270. If a # symbol is encountered, NED branches to Line 470 to begin examining the following characters. Some minor formatting occurs here. If the #p (new paragraph) code is found, a carriage return and four spaces are sent to the print

```
0 rem"Newsletter Editor" v1.3.7
1 cc$=chr$(31):rm=40:goto8070
2 open1,8,15,"i0":print#1,"s0:editor"
3 save"editor",8:gosub6000:close1:end
4 open1,8,15,"i0":print#1,"s0:editor bu"
5 save"editor bu",8:gosub6000:close1:end
6 print"print#4:close4":close4
7 open4,4,7:cmd4:list
8 :
20 rem"*****************************
22 rem"*    MAIN PRINT ROUTINE      *
24 rem"*****************************
26 :
28 ifp=.then50:rem screen only
30 ifp=2then38:rem cbm/vic printer
32 ifc<nethen38:rem ascii printer
33 ifc>191thenc=(c-128):goto38
34 ifc>nsthenc=(c-nc):goto38
36 ifc>nrthenc=(c+nc)
38 ifc=natheni=len(ps$):goto46
40 ps$=ps$+chr$(c):iflen(ps$)<rmthen50
42 fori=rmto1step-1
44 ifmid$(ps$,i,1)<>" "thenpr$=mid$(ps$,i,1)+pr$:nexti
46 print#4,left$(ps$,i):ps$=pr$:pr$="":goto50
48 print#4,chr$(c);
50 printchr$(c);:return
52 :
100 rem"*****************************
110 rem"*      QUICK BROWN FOX      *
120 rem"*****************************
130 :
140 open4,4,sa:open8,8,8,nb$+",p,r"
150 open1,8,15:gosub6000:ifdsthen370
170 printch$;
180 get#8,a$,a$
190 get#8,a$:gosub270:geti$:ifi$="p"then250
200 ifi$="q"then240
210 ifst=.then190
220 ifst=-128then190
240 print#4,ps$:ps$="":gosub6000:goto9410
250 getb$:ifb$=""then250:rem pause
260 goto190
270 c=asc(a$)
280 remifc=nathen380  :rem ret,num
290 ifc=ndthengosub470:goto350:rem #
300 ifc>nqthenc=na:goto350  :rem boil
310 ifc>nfthenc=c-nc:goto350:rem "LtoU"
320 ifc<nethen350  :rem num
330 ifc<ncthenc=c+nr:goto350
340 c=c+nc:rem "UtoL"
350 gosub28:return
360 na$="":nb$="":pn$="Quick Brown Fox"
370 gosub6080:gosub380:goto140
380 rem filename conversion
390 t$=""
400 forn=1tolen(na$):t$=mid$(na$,n,1)
410 t=asc(t$)
420 ift>nfthent=t-nc
430 ift>nrthent=t+nc
440 nb$=nb$+chr$(t)
```

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routine, thus simulating the code. If a #f (form feed) is found, the words "New Page" are printed on the screen to show page breaks. All other codes are stripped out, so that only text will be printed.

Encourage your QBF authors to use only the #p or the @ (return) codes.

WORD MANAGER

This is the 'oddball' of the lot. WM is the 80 column wordprocessor that comes with the Data20 (Protecto, etc.) 80 column card. Text is stored in a USER file as PET ASCII, in FORMATTED FORM. That means that when you read in a WM file it will print on the printer exactly as it was entered on WM. No formatting is done within NED. Encourage your WM authors to set the left margin to 0 and the right margin to whatever you need. Then their text will print perfectly for your newsletter. This module does not use the Print Routine in Line 20, but relies on its own routine beginning in Line 1210. You cannot set the right margin for a WM file.

SPEEDSCRIPT

SpeedScript first appeared this winter in the pages of Compute's Gazette and has achieved great popularity. I've included it here because of that popularity. SpeedScript stores its text as PRG files and Screen Codes. The conversion from Screen Code to PET ASCII takes place in Lines 2200-2270. The first 48 characters in the file are discarded—see Line 2110 where xx is 48. I've made this a variable so you can change it. If you lose text or get some garbage characters at the beginning, adjust xx accordingly in Line 2050.

SEQUENTIAL FILES

Here's where the fun begins. Get out the Excedrin. Most word processors store text in SEQuential file format, so the SEQ file module will read SOMETHING from any SEQ file (database, spreadsheet, etc.). The problems begin with something called a "File Delimiter". This is a character that is inserted into the text to limit the record length (usually to about 254 characters). The most frequently used File Delimiter is the quote mark, but CHR$(13) is also popular. NED will strip out these unwanted Delimiter characters, but it is an involved process. If CHR$(13) is used, then the carriage return in the text will be something else—usually an arrow or " " mark. The blocks of code from Line 5000 to 5340 establish what the File Delimiter and carriage return symbol is for each of the different wordprocessors. The variable "fl" does this. Line 3080 checks for the occurence of the Delimiter and discards it.

```
450 next
460 return
470 get#8,a$:c=asc(a$)
480 ifc<>112then490
483 c=13:gosub28:fori=1to4
486 c=32:gosub28:next:return:rem #p
490 ifc=nlorc=nkorc=nmthen560:rem #nlr
500 ifc=noorc=nhthen560:rem #d,t
510 ifc=njorc=ngthen570:rem#h,c
520 ifc=nnorc=npthen570:rem#u,o
530 ifc=106then570:rem#j
535 ifc=115thenget#8,a$,a$:c=.:return:rem #s
540 ifc=102thenprintrt$"* NEW PAGE *"rt$:c=.:return
550 return
560 get#8,a$,a$,a$:c=.:return
570 c=.:return
580 :
1000 rem"*****************************
1010 rem"*      WORD  MANAGER          *
1020 rem"*****************************
1030 :
1040 pn$="Word Manager"
1050 gosub6080:open4,4,sa:open1,8,15
1060 open8,8,8,na$+",u,r":gosub6000:ifdsthen1050
1070 printch$;
1090 fori=1to15:get#8,a$:nexti
1100 get#8,a$:c=asc(a$):ifc=199then1160
1110 ifc>nqthen1140
1120 gosub1210:geti$:ifi$="p"then1170
1130 ifi$="q"then1160
1140 ifst=.then1100
1160 print#4,ps$:gosub6000:goto9410
1170 getb$:ifb$=""then1170
1180 goto1100
1210 ifp=0then1270
1220 ifp=2then1260:rem vic
1230 ifc<ne thenprint#4,chr$(c);:goto1270
1240 ifc>ns thenprint#4,chr$(c-nc);:goto1270
1250 ifc>nrthenprint#4,chr$(c+nc);:goto1270
1260 print#4,chr$(c);
1270 printchr$(c);:return
1280 :
2000 rem"*****************************
2010 rem"*    SPEED  SCRIPT          *
2020 rem"*****************************
2040 :
2050 pn$="SpeedScript":fl=0:xx=48
2060 ps$="":sa=0:p=0:gosub6080
2090 open1,8,15:open4,4,sa:open8,8,8,na$+",p,r"
2100 printch$;:gosub6000:ifdsthen2060
2110 printch$;:fori=1toxx:get#8,a$:nexti
2120 get#8,a$:gosub2200:geti$:ifi$="p"then2180
2130 ifi$="q"then2170
2140 ifst=.then2120
2170 print#4,ps$:ps$="":gosub6000:goto9410
2180 getb$:ifb$=""then2180
2190 goto2120
2200 ifa$=""then2120
2210 c=asc(a$)
2220 ifc=nbthenc=na:gosub28:return
```

An Important Bulletin for Home Computer Users

This is the only programming system you'll ever need for your home computer.

If you own a small home computer, the story we're about to tell you could be of great help. It's about a revolutionary new software programming system that will let you and your entire family take full advantage of that machine you bought. But first things first, so here's a list of the home computers this product was specifically designed for: Atari 400, 600, 800, XL Series; Commodore Pet, VIC 20 and 64; IBM PCjr; TRS-80 color computer; TI-99/4A and the Timex Sinclair 1000, 2048 and 2068. If you own one of these computers, it would be well worth your time to read further.

THE PROBLEM WITH HOME COMPUTERS

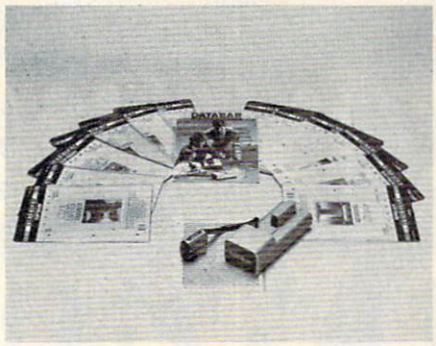
As you probably know, the problem with these small computers is how to get good software into them. Keyboard entry is too time consuming. Diskettes do the job well, but the loaders are expensive and so are the diskettes. Cassette loading is less expensive, but the cassettes themselves still aren't cheap and sometimes a program has to be read again and again before it actually is entered. Furthermore, few of these software manufacturers guarantee their product to run at all.

So unfortunately, a lot of these potentially useful computers are relegated to just game-playing or, even worse, they find their way onto a closet shelf somewhere behind the bowling ball or last year's magazines.

THE SOLUTION IS DATABAR SOFTWARE

Now, thanks to the engineers at Databar Corporation, you can bring your computer back to life. They have developed OSCAR — which stands for an Optical Scanning Reader. What it does is read a bar code program in much the same manner as your local supermarket reads the bar code information on your grocery products. OSCAR plugs directly into your computer, and can read even complex programs extremely fast. In fact, in a recent time test it took a graduate computer programmer 1 hour, 9 minutes and 43 seconds to successfully type-in a program. To enter that same program, it took an eight-year-old child with no computer experience only eight minutes and 17 seconds.

With OSCAR, programming is also inexpensive. The bar code programs read by OSCAR are printed on paper, making the programs inherently a lot less costly to produce than cassette tapes or diskettes. And because the programs cost less to produce, they can be sold to you for significantly less.



But, just because they cost less doesn't mean they aren't of the highest quality. In fact, they are so good and reliable, we are almost alone among software manufacturers to guarantee our product to run as advertised.

Databar Corporation has already developed an extensive library of programs ranging in subject matter from non-violent games to science, health, home management, writing skills and more. These programs are readily available at your local computer store and they retail for under $10 (about 1/3 what a diskette costs).

THE DATABAR CLUB

But amazingly, you can get great software programs for an unbelievable $1.25 each — if you choose to join the Databar Club. Every charter member gets 12 monthly issues of the Databar magazine each featuring at least eight great programs. In addition, this family oriented magazine also features articles on related subjects and computer use in general. The subjects covered by the software include: games, home management, classroom learning, health, law, science, writing skills, and computer programming. What's more, Databar Club members get a three-ring binder for their software programs as well as eligibility for exciting contests.

But whether you join the Databar Club or purchase individual program packages from your favorite retailer — OSCAR can dramatically change the amount and quality of the use you get out of your computer. And let's face it: in the not so distant future much of an individual's competence will be tied up in how well he or she interfaces with a computer.

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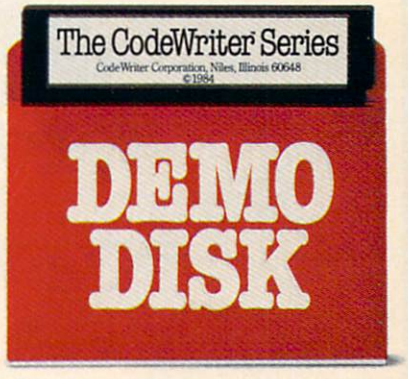

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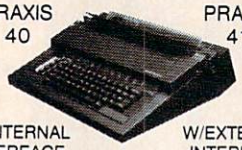

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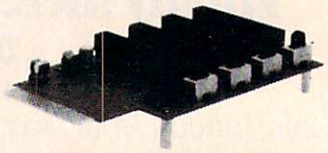

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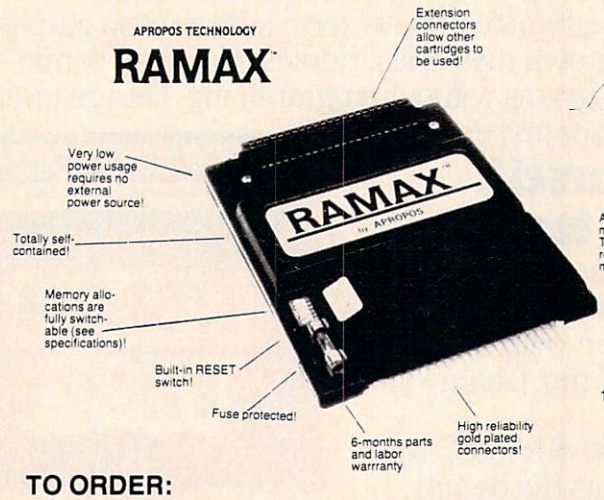
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TOTL.TEXT

About half of the code in the SEQ module deals with TT formatting codes, stripping them out or acting on them much like QBF. TT format codes all begin with the double dollar—$$, followed by specific codes. For example, $$pr is a paragraph command, exactly like QBF's #p. If this $$pr command is found, the program branches to Line 483 in QBF and executes a simulated paragraph. The $$sk, for SKip a line, is interpreted as a line feed. All other $$ commands are stripped out. Your TT authors should only use $$pr and $$sk commands in their text. If they do, the formatted output to the printer will be perfect. TT formatting is done in Lines 3170 to 3290. The $ is detected in Line 3160. If the next character is a $ then it is assumed to be a TT formatting code and is acted upon.

PAPERCLIP

PaperClip text files may be saved as SEQ files with the Control Z option or as PRG files with Screen Codes with the Control S option. NED will handle both but prefers the Control Z version. The Control S version uses the SpeedScript module and the Control Z uses the SEQ module. No formatting is done because formatting codes are not frequently embedded. PaperClip authors should save their text with Control Z for best results.

WORDPRO 3#

This works fine, but the text will be printed using the right margin set up by the author, so if you need a 40 column article, tell your author to declare it in the text, then set NED to match. The same goes for HES text, but caution HES authors to use no embedded codes other than a carriage return, or else the codes will show up on your printer.

EASYSCRIPT

Most of the embedded codes are at the top of the text, so caution your EasyScript authors not to use embedded codes after the initial set up. This will result in clean copy for you.

PROGRAMMING TRICKS

I've used some lines of BASIC code in NED that you might like to incorporate in other programs. Lines 9040-9080 determine if the program is being used on a VIC or a 64 by PEEKing (65532). If the result is 34, it's a VIC and if the result is 226 it's a C-64. If the result is something else, it is either a PET (I don't know which kind) or a VIC/64 equipped with an 80 column card. NED is compatible with 80 column cards.

As you are keying in the program from these pages, you may save the program to the disk by typing RUN2 and ret. This will

```
2230 ifc>nq then return
2240 ifc>nf thenc=c-nc:gosub28:return
2250 ifc<ncthenc=c+nr:gosub28:return
2260 ifc<nethengosub28:return
2270 c=c+nc:gosub28:return
2280 :
3000 rem"*****************************
3010 rem"*  SEQUENTIAL  FILE  READER  *
3020 rem"*****************************
3030 :
3040 gosub6080:open1,8,15:open4,4,sa
3050 open8,8,8,na$+",s,r":gosub6000:ifdsthen3040
3060 printch$;
3070 get#8,a$:ifa$=""then3070
3080 c=asc(a$):iffl-c=0then3070
3090 gosub3150:geti$:ifi$="p"then3130
3100 ifi$="q"then3120
3110 ifst=.then3070
3120 print#4,ps$:ps$="":gosub6000:goto9410
3130 getb$:ifb$=""then3130
3140 goto3070
3150 ifc=94thenc=na:goto3310:rem up arrow
3155 ifc=95thenc=.:goto3310:rem left arrow
3160 ifc<>36then3300:not a $
3170 get#8,a$:ifa$<>"$"thenb=c:c=36:gosub20:c=b:goto3300
3180 tt$="":fori=1to2:get#8,a$:tt$=tt$+a$:next
3190 iftt$="pr"thenc=13:gosub483:return
3200 iftt$="nl"ortt$="sk"thenc=13:goto3310
3210 iftt$="rm"ortt$="in"then3280
3220 iftt$="tb"ortt$="st"then3280
3230 iftt$="pg"ortt$="qc"then3280
3240 ifleft$(tt$,1)="l"then3280
3250 iftt$="ti"thenc=13:goto3310
3260 ifright$(tt$,1)="$"thenget#8,a$:goto3180
3270 return
3280 gosub3290:gosub3290:c=.:goto3300
3290 get#8,a$:ifa$<>" "then3290:return
3300 c=asc(a$):goto3310
3310 gosub28:return
3320 :
5000 rem"*****************************
5010 rem"*         HES WRITER        *
5020 rem"*****************************
5030 pn$="HES/PAGE MATE"
5040 fl=34:rem file delimiter is quote
5050 goto3040
5060 :
5070 rem"*****************************
5080 rem"*         TOTL.TEXT         *
5090 rem"*****************************
5100 pn$="TOTL.TEXT":fl=13
5110 goto3040
5120 :
5130 rem"*****************************
5140 rem"*     PAPERCLIP CONTROL Z   *
5150 rem"*****************************
5160 pn$="PAPERCLIP (control z)":fl=0
5170 goto3040
5180 :
```

SCRATCH the old NED program from the disk and then SAVE the current version. Since I like to have programs backed up, I've included the same routine in Line 4, with a different file name. RUN 4 will update the backup. Proofread the first 5 lines very closely as a mistake here can be fatal. RUN 6 will list the program to the printer. You may put in a line range after 'LIST' on line 7. While I was writing the program modules I used Menu Option 10 to automatically list to the screen the lines I was working on at the time. Line 9400 does this. Lines 9120-9170 determine which computer is being used and prints a different title for the VIC or 64.

CLOSING NOTES

NED is extensively REMed for your convenience, but many of the REM statements should be removed, or not keyed in. Remove all REMs that share a line number with other BASIC statements. Line 28 is an example of a REM that should be removed. This will speed up the program's operation slightly. Do not remove REMs that have their own line number. Line 8000 is an example of a REM that you would leave in. When in doubt, leave it in.

I've placed my name prominently in the title. I've done this so if you make some major modifications to the program or find a bug (!) you will know who to contact. The Newsletter Editor is meant to be a tool for you, like any other utility. It is not meant to be the be-all end-all file reader, but simply a way to capture text generated from a word processor you don't use. If necessary, you may have to enter the captured text in your own word processor to achieve the desired results. The next major modification to NED that I can envision would be to read in a text file, convert it, and write it out in a different word processing format. As an experiment, I rewrote NED to read a sequential, convert it to ASCII, and write the file as a QBF (PRoGram) file back to the second drive on my MSD dual. This allows me to edit the text from QBF. It's a slow process, but it's still much faster than typing it in from scratch.

NED is not fast. It works well, but text is read in at about the same rate as you can read. This is a program that responds well to compiling. I compiled NED on Petspeed for my own use and found the results to be worth the effort. It runs about 20 times faster. Some minor changes were required, and I will gladly provide the new code to you if you can't do it yourself. Read the Petspeed manual closely and you should have no problems.

Please direct any correspondence to me through *Commander* Magazine.

```
5190 rem"*****************************
5200 rem"*       EASYSCRIPT          *
5210 rem"*****************************
5220 pn$="EASYSCRIPT":fl=0:goto3040
5230 :
5240 rem"*****************************
5250 rem"*        WORDPRO 3+         *
5260 rem"*****************************
5270 pn$="WORDPRO 3+":fl=0:goto3040
5280 :
5290 rem"*****************************
5300 rem"*    PAPERCLIP  CONTROL S    *
5310 rem"*****************************
5320 pn$="PAPERCLIP CTL S"
5330 fl=32:xx=48:goto2060
5340 :
6000 rem"*****************************
6010 rem"*     DISK STATUS CHECK      *
6020 rem"*****************************
6030 :
6040 ds=0:input#1,n,ms$,t,s
6045 printrt$;rn$;"Filename:"na$:printn;ms$;t;s
6050 ifn=.thenreturn: rem no disk problem
6055 close4:close8
6060 fori=1to2000:next:print#1,"i"
6065 close1
6070 ds=1:return: rem a disk problem
6075 :
6080 rem"*****************************
6090 rem"*  FILE  SELECTION  SCREEN   *
6100 rem"*****************************
6110 :
6120 printch$;rn$;pn$:print:printm1$:print
6125 print"Right Margin is"rm:print
6130 p=1:printrn$;m2$:inputp$:ifp$="n"thenp=0:goto6170
6140 ifp$="q"then9110
6150 print:printrn$;m4$:inputp$
6155 ifp$="y"thenp=2:sa=7:goto6170
6160 print:printrn$;m3$:inputsa
6170 print:printrn$;"Enter filename ":inputna$
6180 printch$;:return
6190 :
8000 rem *****************************
8010 rem"*   The Newsletter Editor    *
8020 rem"*       Public Domain        *
8030 rem"*   by   Colin F. Thompson   *
8040 rem"*   for Commander Magazine   *
8050 rem"*   Computers: 8K VIC & 64   *
8060 rem"*****************************
8070 :
8080 rem"*****************************
8090 rem"*   INITIALIZE  VARIABLES    *
8100 rem"*****************************
8110 :
8120 dc=4:sa=7:bc=6:fc=7:cc=5
8130 na=13:nb=31:nc=32:nd=35:ne=65:nf=95
8140 ng=99:nh=100:ni=102:nj=104:nk=108
8150 nl=110:nm=114:nn=111:no=116:np=117:nq=122
8160 nr=64:ns=96:close1:closedc:close8
8170 rn$=chr$(18):rt$=chr$(13):rem rev on and ret
```

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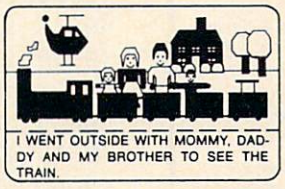

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```
8180 ch$=chr$(147):rem clr/home
8190 m1$="Press P to Pause"+rt$+"Press Q to Quit."
8200 m2$="Print the text <y/n/q>"
8210 m3$="Printer Secndy address"
8220 m4$="CBM printer <y/n>"
8230 m5$=rt$+"END OF FILE-HIT A KEY"
8240 :
9000 rem"*****************************
9010 rem"*    MAIN  MENU  SETUP      *
9020 rem"*****************************
9030 :
9040 ifpeek(65532)<>34then9070:rem vic
9050 poke36879,248:printchr$(158):ct=20
9060 goto9100
9070 ifpeek(65532)<>226then9100:rem c64
9080 poke53280,bc:poke53281,fc:rem 64 colors
9090 sa=0:p=0:ct=64:bl=16:sl=16
9100 :
9110 printchr$(14);chr$(144);ch$;rn$;
9120 print"THE NEWSLETTER EDITOR";
9130 ifct=20thenprint" ";:goto9150
9140 print
9150 printrn$;"by  Colin F. Thompson";
9160 ifct=20thenprint" ":rem 1 space
9170 print:print:printcc$;"Read a File From"
9180 print"Which Word Processor?":print
9190 print"1. Quick Brown Fox"
9200 print"2. Word Manager"
9210 print"3. SpeedScript"
9220 print"4. Totl.Text"
9230 print"5. Paper Clip CTL Z"
9240 print"6. Paper Clip CTL S"
9250 print"7. EasyScript"
9260 print"8. WordPro 3+"
9270 print"9. HES / Page Mate":print
9280 printrn$;"10. Exit  Program "
9290 printrn$;"11. Cursor Color  "
9300 ifct=20then9350:rem vic20
9310 printrn$;"12. Screen Color  "
9320 printrn$;"13. Border Color  "
9350 print:input"Which Number";a
9355 ifa>13then9110
9360 ifa<7thenonagoto360,1000,2000,5070,5130,5290
9370 ifa>6thena=a-6
9380 onagoto5190,5240,5000,9400,9500,9470,9440
9390 goto9110
9400 list 20-  :rem you change this #
9410 close4:close8:close1:printm5$;
9420 geta$:if a$=""then9420
9430 goto9110
9440 ifct<>64then9120: rem color changes
9450 bc=bc+1:ifbc>blthenbc=0
9460 poke53280,bc:goto9110
9470 ifct<>64then9110
9480 fc=fc+1:iffc>slthenfc=0
9490 poke53281,fc:goto9110
9500 ifcc>7thencc=0
9505 cc=cc+1
9510 onccgosub9530,9540,9550,9560,9570,9580,9590,9600
9520 goto9110
```

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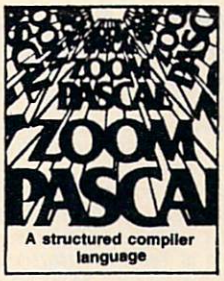

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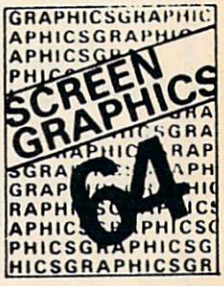

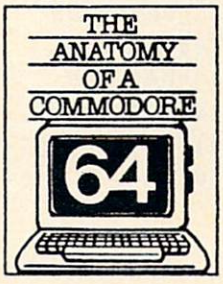

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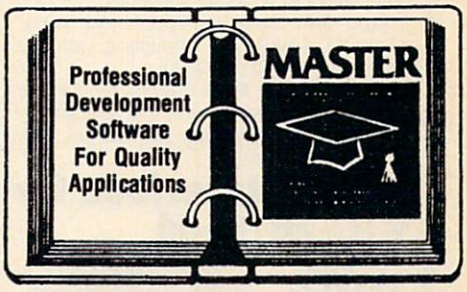

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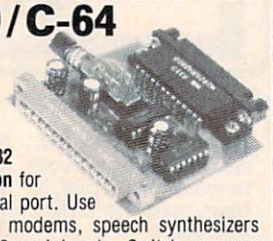

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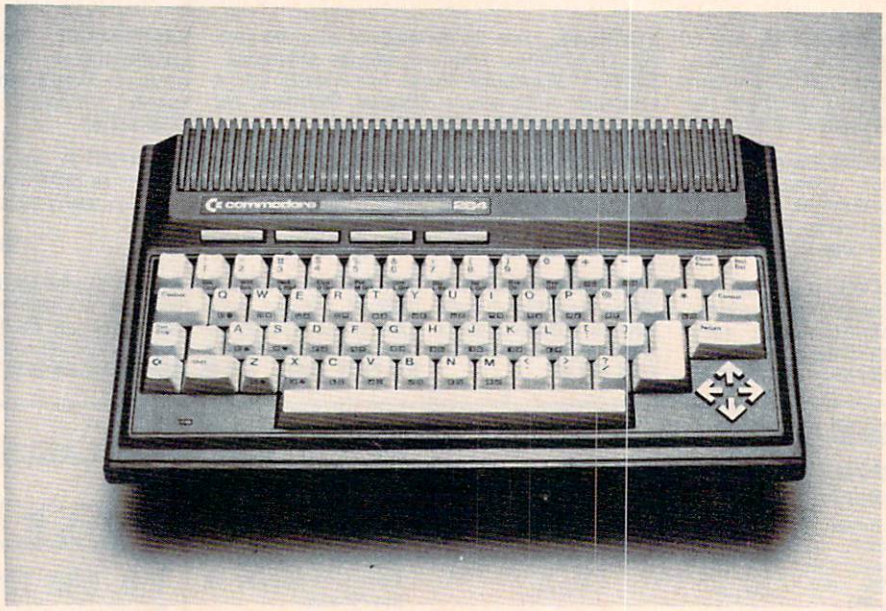
```
9530 cc$=chr$(5):return:rem white
9540 cc$=chr$(28):return:rem red
9550 cc$=chr$(30):return:rem green
9560 cc$=chr$(31):return:rem blue
9570 cc$=chr$(144):return:rem black
9580 cc$=chr$(156):return:rem purple
9590 cc$=chr$(158):return:rem yellow
9600 cc$=chr$(159):return:rem cyan
9610 return
9900 rem"*****************************
9910 rem"* Editor reads files from    *
9920 rem"* many word processors and   *
9930 rem"* display the text on the    *
9940 rem"* screen or printer. The     *
9950 rem"* printer's output is format-*
9960 rem"* ed and the right margin is *
9970 rem"* varied by the RM variable  *
9980 rem"* in line 1. Use the CBM     *
9990 rem"* PRINTER?=Y when possible.  *
9999 rem"*****************************

ready.


This  listing was printed on a DYNAX DX 15
letter quality printer at 12 pitch with a
15 pitch printwheel.

O=the number zero
o=the letter "oh"
1=the number one
l=the letter"ell"
""=a null character
" "= a space
```



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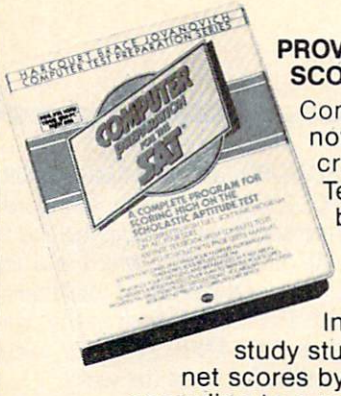

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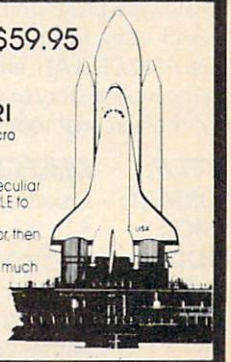

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Electronic Blackboard

By Maryanne Dodd

It's summertime and the living is easy. School is recessed for the year and no one wants to work during recess. In fact few kids would even want to think about education even if it is educational computing. But education does not have to be just reading, writing and arithmetic. There is another facet of learning that I like to think of as enabling skills. These are skills that are not directly connected to the three "Rs" but enable one to learn the basic skills of the three "Rs". The software that I'm reviewing this month are games that have educational or motivational value but they are so much fun that children will probably not even think of them as educational software.

MATCHBOXES from BRODERBUND is a concentration type game that is sure to captivate anyone from six to sixty. It is lively and it is exciting and it provides practice using visual and auditory discrimination and memory.

BRAIN STRAINERS from CAROUSEL may not strain your brain but the three games contained in this package are sure to stretch your memory skills and maybe even sweep away some of the summer cobwebs.

Also from CAROUSEL is my new friend 'TELLY TURTLE'. 'TELLY TURTLE' introduces computer literacy and a beginning LOGO type programming.

And lastly from DAVKA, I have SAMSON AND DELILAH, an action game based on the Biblical story that would make a terrific motivational tool.

TITLE: MATCHBOXES
FORMAT: Diskette/Cassette
PRICE: $29.95
MODEL: Commodore 64
AUDIENCE: Ages six through adult
SUMMARY: Memory and concentration game featuring sound and graphics.
SOURCE: BRODERBUND SOFTWARE, INC.
17 Paul Drive
Rafael, CA 94903
(415) 479-1170

Back in the heyday of television quiz games, one of the longest running and most popular was a show called CONCENTRATION. I can remember watching as a child and trying to out guess the contestants. Since then many board games and simplified computer games have been modeled after the television game. MATCHBOXES from BRODERBUND is a lively adaptation of CONCENTRATION that adds some new computerized bells and whistles.

GET YOUR THINKING CAPS ON

MATCHBOXES offers four game variations: MATCHBOXES, GUESSWORD, REVERSEWORD, and SCRAMBLEWORD. It may be played by two people or one player against the computer. If the computer is chosen as an opponent there are three levels of difficulty—easy, hard and very hard.

The simplest MATCHBOXES game consists of a grid of thirty six squares, four vertical and nine across. Initially all of the squares are blank. Using a joystick the players move an "X" to uncover the boxes. If two identical boxes are uncovered, the player scores two points and gets another turn. If no match is made the other player is given a turn. There are two wildcards hidden somewhere on the screen. The winner is the player with the most points at the end of the game.

The other three games have words concealed behind the boxes. If two people are playing, each enters a word containing two to six letters at the start of the game and the opponent is given a chance after each match to guess the word by analyzing the visible parts. If one person is playing, the computer enters a word for the player to guess. The winner of the game is the first person to correctly guess the word. If neither player guesses the word before all of the possible matches, the winner is the player with the highest number of points. There are three variations of wordgames—GUESSWORD, REVERSEWORD, and SCRAMBLEWORD. During GUESSWORD the chosen word in the correct sequence is hidden behind the boxes. REVERSEWORD, which is a little harder, reverses the order of the letters of the word. The most difficult of the wordgames is SCRAMBLEWORD which scrambles the letters of the word.

SOUND AND GRAPHICS

The sound and graphics used in MATCHBOXES are both excellent. There are three different screens or fifty four different matching parts of boxes. Behind each box is a colorful animated figure. There is a PAC MAN chasing a GHOST, a stick figure doing jumping jacks, cars racing, a top spinning and many more miniature, colorful figures. As each box is uncovered the computer plays a line of a familiar folk song such as: "Clementine", "I've Been Working On the Railroad", "Pop Goes the Weasel" and behind the wildcards there is always "Happy Birthday". The sound and graphics together are so remarkable that they would be worth watching without the game. I guarantee that no one will ever get bored with the screen activity.

EDUCATIONAL VALUE

The people at BRODERBUND have coined a new word to describe software such as MATCHBOXES. They call them "edutainment". Entertainment products with educational value. I like the concept. There is so much learning that requires more than the easily measured math and reading skills.

As in all concentration games, MATCHBOXES focuses on memory skills. The game requires perceptual and discriminatory memory skills to make matches. Some of the pairs are so similiar that they require more discrimination than others. For example there are two fireworks displays with one exploding outward and the other exploding inward and several of the scenes are the same except for color and melody. During the wordgames players must visualize the whole

word from analyzing a part and be able to enter the letters in the correct sequence on the keyboard. As an extra bonus, spelling and vocabulary words could be used for the wordgames.

My family has really enjoyed MATCHBOXES. It is fun as a one player against the computer and it is also one of those games that adults can play with younger children and be challenged without being bored. I would highly recommend this game as family "edutainment."

TITLE: BRAIN STRAINERS
FORMAT: Diskette

MODEL: Commodore 64
AUDIENCE: Age five and above
SUMMARY: A set of three memory games designed to increase auditory and visual discrimination.
SOURCE: CAROUSEL SOFTWARE, INC.
877 Beacon St.
Boston, WA 02215
(617) 437-9419

CAROUSEL is an educational software company that makes it their motto to produce high quality software that is both educational and entertaining. The games found in BRAIN STRAINERS were designed by Bob Stewart, a professional software engineer with fifteen years experience. They are games that he has played with and tested on his own children. The package contains three games—CLEF CLIMBER, FINDERS KEEPERS, and FOLLOW THE LEADER. All of the games maybe played by one to four players.

CLEF CLIMBER

CLEF CLIMBER is an auditory skill game designed to increase the players' ability to discriminate between two musical tones. The object of the game is to mimic the note played by the computer by the use of a joystick or the "i,j,k,m, keys" on the keyboard. The players may choose whether to hear the notes simultaneously, in alternating sequence, or one time only. If the player is good and wants to really make the game challenging he can choose a time limit to enter a response. The players also have the option of choosing whether the notes will sound as though they are emitted from a brass horn or a piano keyboard. When the player thinks that he has found a matching tone he pushes the joystick button and the correct note, along with his choice, is displayed on a musical staff on the keyboard.

CLEF CLIMBERS is an innovative way to practice auditory discrimination. The game requires an exactness that will promote good listening skills. As an added bonus players will also be introduced to musical notation and gain practice in reading notes on a musical staff.

FINDERS KEEPERS

The second game of the series is a computerized concentration cardgame. The players choose a screen consisting of a grid where cards are laid out as in solitaire. Difficulty depends upon the size of the grid chosen. Players have the option of choosing from a grid of four cards across and four down, up to a grid of eighteen cards across and eight down. The object of the game is to make matches by moving a window over the cards and exposing the character graphics underneath. The winner is the player that obtains the most matches and the highest score. At the end of the game "YOU DID IT" flashes across the screen and the winner is congratulated with a line from the Hallelujah Chorus.

Playing FINDERS KEEPERS is definitely a way to increase concentration and visual memory skills. The game offers enough variety in the size of the grids so that younger children or people with poor visual memory skills or discrimination skills can enjoy the game while older more experienced players can enjoy the challenge of the largest grid.

FOLLOW THE LEADER

FOLLOW THE LEADER is a Commodore 64 version of the hand held computer game SIMON, from MILTON BRADLEY. As in the hand held game there are four colored triangles, each of which has a different tone characteristic. The object of the game is to copy the sequence displayed by the computer. The computer starts by blinking one of the triangles and sounding a tone. Each time the player enters a correct response the computer adds another triangle/sound to the sequence. The players may choose the maximum number of patterns from one to forty that they want in each sequence.

This game stresses the development of sequential memory by providing the players with both a visual and auditory stimuli.

SOUND AND GRAPHICS

All three of these games employ sound and graphics that are suitable to the learning concepts that are being emphasized. The screens are colorful and well illustrated without being busy or distractful. Color is used efficiently and it is obvious

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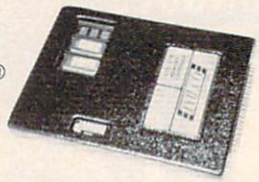

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that the author paid attention to small details in choosing the designs that would appeal to a wide range of skill and age levels.

FAMILY ENJOYMENT

BRAIN STRAINERS is software that can be enjoyed by the whole family. It is the type of game that requires thinking power and concentration. I can easily picture this being the game that children could talk grandparents into playing with them. I am sure that both age groups would be fascinated. I would recommend it as a low key game that requires thinking power instead of joystick manual dexterity.

TITLE: ***TELLY TURTLE***
FORMAT: Diskette/Cassette

MODEL: Commodore 64
AUDIENCE: Ages five through twelve
SUMMARY: An abbreviated LOGO type language emphasizing turtle graphics and sound.
SOURCE: CAROUSEL
SOFTWARE, INC.
877 Beacon St.
Boston, MA 02215
(617) 437-9419

Hello, did you know that you can have a friend named TELLY TURTLE living inside of your computer? He comes complete with his own play yard and bag of tricks and is just waiting for you to play with him, as he shows you some of his tricks and lets you teach him how to do some tricks that you have designed. All that you have to do to release TELLY inside your computer is to load in the TELLY TURTLE program from CAROUSEL.

Actually TELLY TURTLE is a simplified game derivative of LOGO that utilizes the joystick and icons for programming turtle graphics and simple sounds.

PROGRAMMING LEVELS

There are four levels of programming capability with each level building upon the preceding one. Level one, the simplest level, introduces TELLY and allows the student to make TELLY turn right or left, change colors to green, yellow or red and play two musical tones. All commands during levels one and two are executed in the immediate mode.

Level two introduces the concept of iteration, that is specifying the number of times an action is to be repeated.

Real programming gets underway in level three. The student is now able to enter several commands, change their sequence and debug his program before he directs TELLY to perform the actions.

The last level teaches the novice programmer how to do subroutines and to store his programs on either diskette or cassette for future recall. Also contained in level four are some storage bins that contain clever demonstrations that can be studied, modified and used in subroutines for other programs or as screens for TELLY games.

DOCUMENTATION

Even though TELLY TURTLE is very user friendly it still helps to have some written directions for those people who need the security of reading before they jump right into the programming play yard. CAROUSEL has provided a detailed twenty four page manual that will guide a beginning computer user every step of the way. Interspersed in the lesson for each level are suggestions for using the concepts learned at each level.

EDUCATIONAL VALUE

Even though TELLY TURTLE appears to the child to be a neat program that allows them to draw pretty pictures and manipulate the cute little green fellow around the screen, it is a programming language. As with any language the programmer must utilize logical thinking, problem solving and organizational skills. Programming TELLY TURTLE is so simple that nonreading kindergarteners (with limited adult initial instruction) can soon be building programs and putting TELLY through his paces. But on the other hand, the graphic capabilities are sophisticated enough that the older children will be fascinated with the intricate geometric designs and graphic pictures that they can create with TELLY. All users will increase their awareness of direction, spatial relationships and measurement while the more mature user will deductively discover some of the laws that govern geometry. Since there are no rules for playing with TELLY, you can't make him go the wrong way, children of all ages will be encouraged to use their imagination and creative abilities.

TITLE: ***SAMSON AND DELILAH***
FORMAT: Diskette/Cassette
PRICE: $24.95
MODEL: Commodore 64
AUDIENCE: Ages ten and above
SUMMARY: Arcade action game based on the Biblical story of Samson and Delilah.
SOURCE: DAVKA CORPORATION
845 N. Michigan Avenue
Suite 843
Chicago, Illinois 60611
(800) 621-8227

DAVKA is a Software House that produces quality educational and entertain-

ment software that is based on Bible and/or Hebrew History. One of their newest releases is SAMSON AND DELILAH, an action game, that derives it's scenario from the story of Samson in the book of Judges.

GAME DESCRIPTION

Upon loading the program, there are several screens giving the background information detailing the Biblical story of Samson, much like the start of an adventure game. Then the player is given choices on the type of obstacles and speed to set up the game.

The game is a joystick controlled action game with levels displayed on the screen. The object of the game is to move Samson from the sixth floor of the Temple to the foundation pillars and thus defeat the Philistines. Sounds easy, doesn't it? Not so. Remember the story of Samson? He was some fierce warrior and life was not easy for him. Along the way to the pillars there are several obstacles. There are gray, green, yellow and red guards that must be either avoided or whacked with a jawbone if one is available. Also there is a lion roaming one of the levels and he has to be dealt with. Then there is Delilah, an encounter with either her or her fiery scissors can only lead to disaster.

Unlike the Biblical Samson who had only one life, the players are given three lives or chances to make it to the Temple Pillars. The difficulty of the game is controlled by the options chosen at the start. The players have a choice of twelve options that determine the speed of the game, day or night setting, types of guards, types of scissors, and pits and secret doors. Players can choose one or all of the options for any game.

After three attempts, the game ends and you are given a score that reflects the number of obstacles successfully encountered and a spirit rating such as: "Spirit is Sleeping" or "Spirit is Incredible."

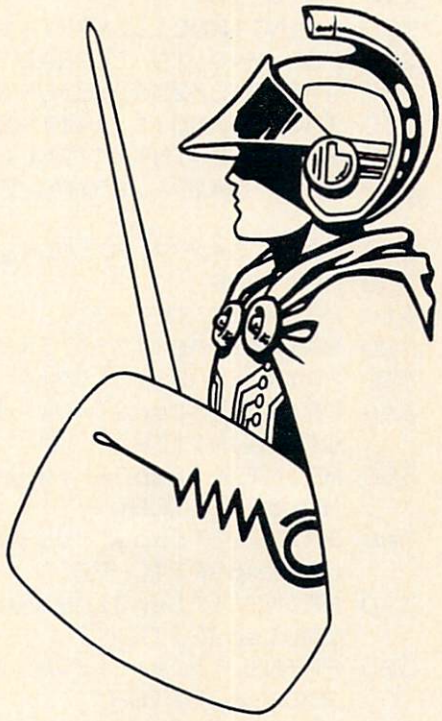
When I was given this game to review, I opened it not knowing quite what to expect. After trying it with very little success I thought, Oh, well, I'm stuck with a sleeping spirit, what can you expect at my age. So I left the game out for my teenage babysitter and his spirit was not incredible; in fact, it wasn't even noble. Later I showed the game to some other "arcade experts" and the general concensus was that the game was definitely challenging and worthy of their attention.

SOUND AND GRAPHICS

The sound and graphics are both very well done. The music accompanying the opening of the game is an enchanting melody written in a minor key. During the game the typical computer sounds signal the approaching obstacles or disastrous conditions. The graphics are done effectively using good color and a combination of sprites and character graphics.

EDUCATIONAL VALUE

SAMSON AND DELILAH should really be classified in the entertainment software category, but it does have limited educational value especially as a motivational tool. Having taught Sunday School a number of years, I know how hard it is to get the attention of boys in the upper elementary and junior high school age groups. They feel that they have heard all the lessons a hundred times and know everything. SAMSON AND DELILAH would definitely stop their groans about "sissy" games and have them clamoring for their turn at the computer. Who knows after finding that the story of Samson is exciting, some of them just might decide that they would like to learn more about some other Biblical heroes and start doing some studying and reading on their own. One thing I'm sure of is that they would long remember the details and the plot long after playing the game. Another thought that I have is that SAMSON AND DELILAH offers an alternative to the arcade game for those that are tired of seeing gorillas fall off of ladders.



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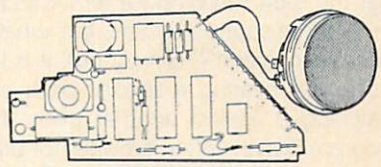

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The Music Instructor

by Robert Parr

Inspiration sometimes comes from the strangest places. For instance, my junior high school band director explained to me the rigors of keeping his band in tune, and jokingly asked me to set up a computer to teach his students pitch recognition. The more I thought about it, the more the idea appealed to me. The results are as follows.

PROGRAM OPERATION

"Okay," you're probably saying, "I know that the C-64 can produce terrific sound on its three sound registers, but what is 'pitch recognition'?" Simply put, it is the process of hearing a specific pitch and matching it against another pitch. The program I have written provides for practice in two different forms of pitch recognition—interval identification and intonation. In music, an interval is the difference in pitch between two tones. For example, the interval between a "C" and a "G" is equal to five, while a "C" and a "B" make up a seventh.

The intonation routine involves the finer aspect of pitch recognition—the ability to bring one tone exactly into tune with another. In the program, you must increase or decrease the pitch of a random tone until it matches up with the other tone. It is difficult at first, but becomes easier with practice.

PROGRAM DESIGN

The program is structured as follows: Lines 10-20 contain the set up commands. The Title Menu is contained in lines 30-140. Lines 200-300 select the two pitches used in the intonation routine, and the intonation Menu is in lines 310-470. Lines 480-530 contain the subroutines that sound the two pitches. Lines 540-570 adjust the pitch of the second tone, and the two tones are compared for accuracy in lines 580-595. The intonation Menu is found in lines 660-780; the notes are played in lines 790-850, and the interval is tested by the routine contained in lines 860-910. The Data for the program is stored in lines 1000-1030.

```
 10 POKE 53280,6:POKE 53281,15:PRINT ''[blk]''
 20 PRINT ''[clr]'':FOR Z=54272 TO 54296:POK
    E Z,0:NEXT
 30 PRINT TAB(10)''THE[sp]MUSIC[sp]INSTRUCTO
    R''
 40 PRINT TAB(10)''====================='': P
    RINT
 50 PRINT ''[sp][rvs-on]1[rvs-off]-INTERVALS
    ''
 60 PRINT ''[sp][rvs-on]2[rvs-off]-INTONATIO
    N''
 70 PRINT ''[sp][rvs-on]3[rvs-off]-EXIT''
 90 PRINT:PRINT ''[sp]WHICH'';
100 INPUT M$
110 IF M$=''1'' THEN 600
120 IF M$=''2'' THEN 200
130 IF M$=''3'' THEN END
140 GOTO 20
200 Z=INT(RND(1)*37)+1
210 FOR Y=0 TO Z:READ C:NEXT
220 A=INT(C/256):B=C-(A*256)
230 Z=INT(RND(1)*41)-20
240 F=C+Z:D=INT(F/256):E=F-(D*256)
250 POKE 54296,15:POKE 54284,33:POKE 54285,3
    3
260 POKE 54277,33:POKE 54278,33
300 RESTORE
310 PRINT ''[clr]''
320 PRINT TAB(15)''INTONATION''
330 PRINT TAB(15)''==========='':PRINT
340 PRINT ''[sp][rvs-on]1[rvs-off]-PLAY[sp]1
    ST[sp]PITCH''
350 PRINT ''[sp][rvs-on]2[rvs-off]-PLAY[sp]2
    ND[sp]PITCH''
360 PRINT ''[sp][rvs-on]3[rvs-off]-PLAY[sp]B
    OTH[sp]PITCHES''
370 PRINT ''[sp][rvs-on]4[rvs-off]-LOWER[sp]
    2ND[sp]PITCH''
380 PRINT ''[sp][rvs-on]5[rvs-off]-RAISE[sp]
    2ND[sp]PITCH''
390 PRINT ''[sp][rvs-on]6[rvs-off]-COMPARE[s
    p]PITCHES''
400 PRINT:PRINT ''WHICH'';:INPUT N$
410 IF N$=''1'' THEN 480
420 IF N$=''2'' THEN 500
```

```
430 IF N$=''3'' THEN 520
440 IF N$=''4'' THEN 540
450 IF N$=''5'' THEN 560
460 IF N$=''6'' THEN 580
470 GOTO 310
480 POKE 54276,33:POKE 54273,A:
    POKE 54272,B
490 FOR T=1 TO 2000:NEXT:POKE 5
    4276,32:GOTO 310
500 POKE 54283,33:POKE 54280,D:
    POKE 54279,E
510 FOR T=1 TO 2000:NEXT:POKE 5
    4283,32:GOTO 310
520 POKE 54276,33:POKE 54283,33
    :POKE 54273,A:POKE 54272,B:
    POKE 54280,D
521 POKE 54279,E
530 FOR T=1 TO 4000:NEXT:POKE 5
    4276,32:POKE 54283,32:GOTO
    310
540 F=F-3:D=INT(F/256):E=F-(D*2
    56)
550 GOTO 500
560 F=F+3:D=INT(F/256):E=F-(D*2
    56)
570 GOTO 500
580 IF F>C-2 AND F<C+2 THEN PRI
    NT ''VERY[sp]GOOD!'':FOR P=
    1 TO 2000:NEXT:GOTO 20
590 PRINT ''OUT-OF-TUNE.'':IF F
    >C THEN PRINT ''#2[sp]SHARP
    .'':FOR P=1 TO 2000:NEXT:GO
    TO 310
595 PRINT ''#2[sp]FLAT.'':FOR P
    =1 TO 2000:NEXT:GOTO 310
600 FOR Y=0 TO 7:READ C:NEXT
610 Z=INT(RND(1)*7):FOR Y=0 TO
    Z:READ F:NEXT:I=Z+2:RESTORE
620 A=INT(C/256):B=C-(A*256)
630 D=INT(F/256):E=F-(D*256)
640 POKE 54296,15:POKE 54284,33
    :POKE 54285,33
650 POKE 54277,33:POKE 54278,33
    :ZZ=1
660 PRINT ''[clr]''
670 PRINT TAB(15)''INTERVALS''
680 PRINT TAB(15)''=========='':
    PRINT
690 PRINT ''[rvs-on]1[rvs-off]-
    PLAY[sp]1ST[sp]NOTE''
700 PRINT ''[rvs-on]2[rvs-off]-
    PLAY[sp]2ND[sp]NOTE''
710 PRINT ''[rvs-on]3[rvs-off]-
    PLAY[sp]CHORD''
720 PRINT ''[rvs-on]4[rvs-off]-
    ENTER[sp]INTERVAL''
730 PRINT:PRINT ''WHICH'';:INPU
    T N$
740 IF N$=''1'' THEN 790
750 IF N$=''2'' THEN 810
```


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```
760 IF N$=''3'' THEN 830
770 IF N$=''4'' THEN 860
780 GOTO 660
790 POKE 54276,33:POKE 54273,A:
    POKE 54272,B
800 FOR T=1 TO 2000:NEXT:POKE 5
    4276,32:GOTO 660
810 POKE 54283,33:POKE 54280,D:
    POKE 54279,E
820 FOR T=1 TO 2000:NEXT:POKE 5
    4283,32:GOTO 660
830 POKE 54276,33:POKE 54283,33
    :POKE 54273,A:POKE 54272,B:
    POKE 54280,D
840 POKE 54279,E
850 FOR T=1 TO 4000:NEXT:POKE 5
    4276,32:POKE 54283,32:GOTO
    660
860 PRINT:PRINT ''ENTER[sp]INTE
    RVAL[sp](2-8)'';:INPUT N$
870 IF VAL(N$)<>I THEN 890
880 PRINT ''VERY[sp]GOOD!'':FOR
     PAUSE=1 TO 2000:NEXT:GOTO
    20
890 IF ZZ=3 THEN 900
895 PRINT ''INCORRECT.[sp, 2 ti
    mes]TRY[sp]AGAIN.'':FOR P=1
     TO 2000:NEXT:ZZ=ZZ+1:GOTO
    660
900 PRINT ''INCORRECT.[sp, 2 ti
    mes]THE[sp]INTERVAL[sp]WAS[
    sp]A[sp]VALUE[sp]OF[sp]'';I
    ;'','',''
910 FOR PAUSE=1 TO 2000:NEXT:GO
    TO 20
1000 DATA 1072,1204,1351,1432,16
     07,1804,2025,2145,2408,2703
     ,2864
1010 DATA 3215,3608,4050,4291,48
     17,5407,5728,6430,7217,8101
     ,8583
1020 DATA 1136,1275,1517,1703,19
     11,2273,2551,3034
1030 DATA 3406,3823,4547,5103,60
     69,6812,7647,9094
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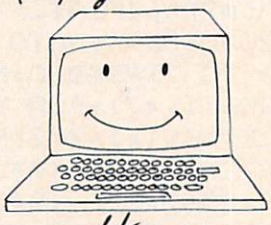

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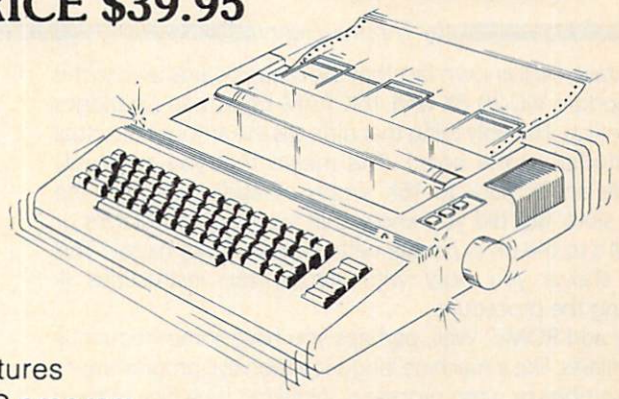

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Modify Your 8K Cartridge to Include ROM's

by Thomas Henry

It's a fairly well known fact that the circuit boards used in the Commodore VIC-20 8K and 16K RAM Expansion Cartridges are identical. The only thing that differs is the amount of actual RAM stuffed in the board. This means that you can easily upgrade an 8K pack to 16K simply by adding chips in the empty slots. But did you know that you can add ROM's or EPROM's to the 8K expander with a minimum of hassle? This article shows you how with step-by-step instructions illustrating the procedure.

Why add ROMs? Well, perhaps you have some frequently used utilities, like a machine language monitor, programmer's aid, assembler or word processor. Wouldn't it be nice to have these available the minute you turn on your VIC-20? With ROM based programs this is possible and there's no more waiting for cassette decks or disk drives to do their thing! And if you're into software development for commercial applications this modification ought to appeal even more. Consider that it is possible to map 8K of RAM and 8K of ROM into the $A000 region with this arrangement. You can carry out your software development in the RAM area and when you are certain that the program works correctly, you can then burn it into EPROM and plug it into the ROM compartment. Keeping in mind the cost of an 8K cartridge and the few parts needed to implement the design, this may well be the least expensive (albeit simple) development system around!

HOW THE RAM/ROM CARTRIDGE WORKS

The theory of this system is simple. We'll take an ordinary 8K RAM cartridge, add four sockets for the 2716 EPROM's and throw in a selector switch which will allow you to alternately map the RAM or ROM into the $A000 through $BFFF region. This portion of the VIC-20's operating system is selected because the $A000 region incorporates an unique auto-start feature which is particularly useful in ROM or EPROM applications. (See Nick Hampshire's THE VIC REVEALED, Hayden Book Company, 1982, pp. 102-103 for a description of this feature). Figure one shows the arrangement of the RAM, ROM and switch. Notice how the DPDT switch sends the BLK5 signal to either the RAM or ROM depending on its position. But equally important is the way that the +5V line is sent to the memory (either RAM or ROM again) which is to be deselected. Your immediate impression might be that a SPDT switch would suffice here, but it's crucial that the deselected memory chip enable line be pulled up to a solid +5V. Hence the DPDT switch. Incidentally, old electronic hands will recognize this switch arrangement as a standard polarity reverser.

There are, of course, several different areas into which ROM may be mapped on a VIC-20. While this article describes only one of them, the same principles apply to the rest. So, even if you have no immediate use for this modification, you may want to read on and see if what's said might apply to your own particular project.

By the way, economics and convenience play a major role in the usefulness of modifying an 8K cartridge to include ROM. Chances are, if you were to design a RAM/ROM board from scratch, you would end up spending more time and money than if you were to start with a factory built 8K expander. Those empty slots in the commercial unit sure are handy and just beg to be put to work!

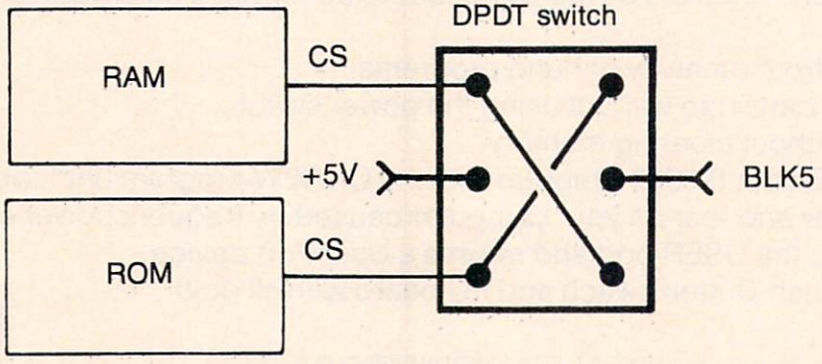

FIGURE 1

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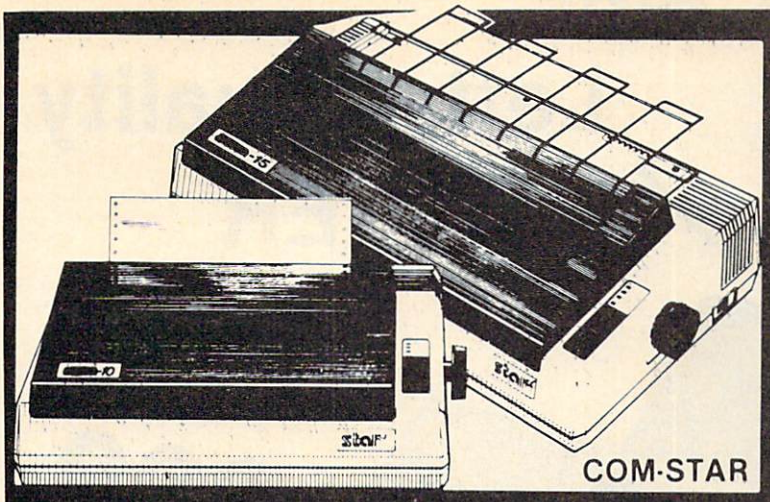

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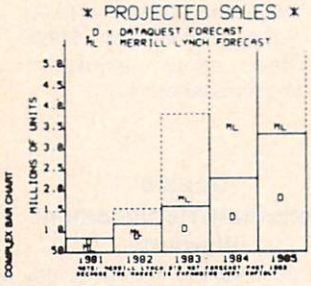

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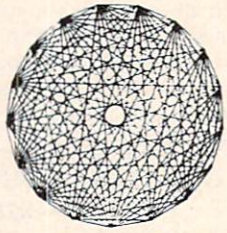

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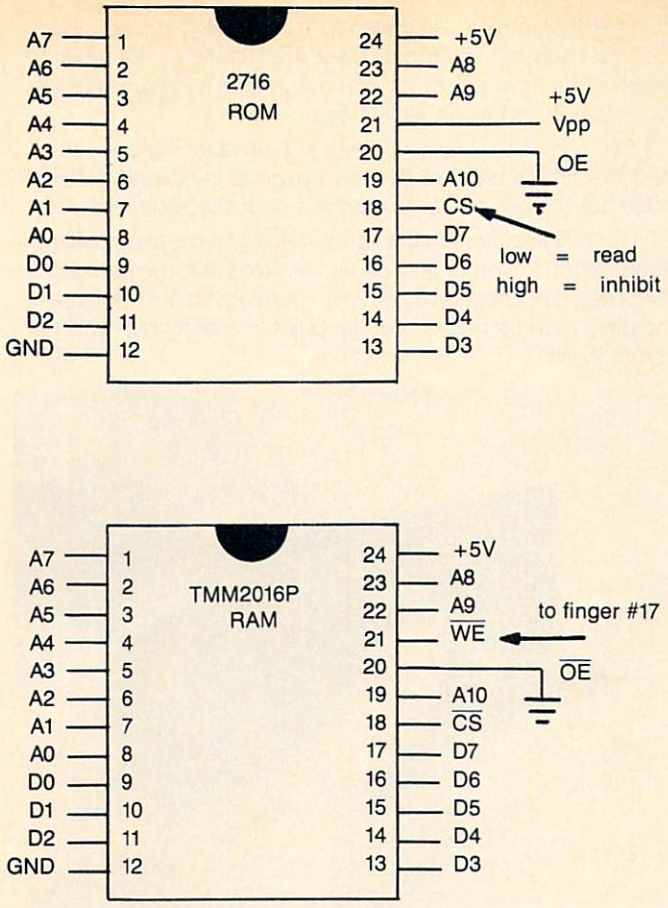


RAM pinout versus ROM pinout

FIGURE 2

One final detail needs to be hit before we can move on to the "how-to-do-it". If we are to make this modification work we need to know if the ROMs or EPROMs we intend to use are pin compatible with the RAMs already in the unit. Well, the answer is "almost". Refer to Figure two for a comparison of the TMM2016P RAM chip (the type already in the cartridge) with the 2716 (a common type of 2K EPROM). Notice how all of address lines, data lines, power lines, chip select lines and output enable lines are in identical locations. So far, so good!

In fact the only line which causes trouble is pin 21. On the TMM2016P, pin 21 functions as a read-write line. When this line is low, you may write to the chip and when it is high you may read from it. Now, on the 2716 this pin is used for programming purposes (hence its name "Vpp") and to accomplish a read this pin must be high. Since both chips require this pin to be high to accomplish a read, you may think that you can simply pop the 2716 in and it would work right away. In theory this is true, but unfortunately, pin 21 on the 2716 draws a hefty hunk of current, more than the VIC-20's R/W line can provide. The only sensible way to conquer the problem is to pull this line high permanently. After all, we only want to read from it anyway, so this solution serves the purpose quite admirably!

PERFORMING THE MODIFICATION

Now that we have an idea of the general approach, let's see how to actually perform the modification. Let's get a few warnings out of the way:

1) Modifying your 8K cartridge voids your warranty with Commodore.

2) While the instructions included herein are believed to be accurate, neither the author of this article nor the publisher of this magazine can be held accountable for any mishaps. This information is provided to further the public's knowledge of the electronics of RAM cartridges and no warranty of any kind is to be inferred.

3) Some of the components in the 8K RAM cartridge are sensitive and can be easily destroyed by static electricity. Observe all normal grounding procedures. Do not wear clothes made of synthetic fibres and use a grounded soldering iron. Alternatively, if no grounded iron is available, unplug the unit from the wall momentarily while soldering any joint. This minimizes the occurrence of stray electrostatic fields.

4) If any of these steps make no sense to you, STOP! Get a friend or dealer more knowledgeable in electronics to complete the project.

While these four warnings may sound rather grim, actually the work is quite straightforward. As usual, the more experience in electronics that you've had, the easier the work will seem. I found one evening allowed plenty of time to complete the project.

To best execute this modification, it is essential to perform the various steps in the correct order. Here follows a checklist which should considerably simplify the task.

1) Remove the single screw which is to be found on the back side of the 8K RAM expander. See Figure three. Set aside for later re-assembly.

2) The cartridge is held together by two snap-lock type connectors located inside the cartridge and below the two slots on the cartridge back. To free these, slip the blade of a small screwdriver into one slot at a time and carefully pry backward. See Figure four. After freeing both connectors, firmly grasp one half of the case with each hand and lever apart. Be careful not to damage either of the plastic snap-locks. Refer to Figure five.

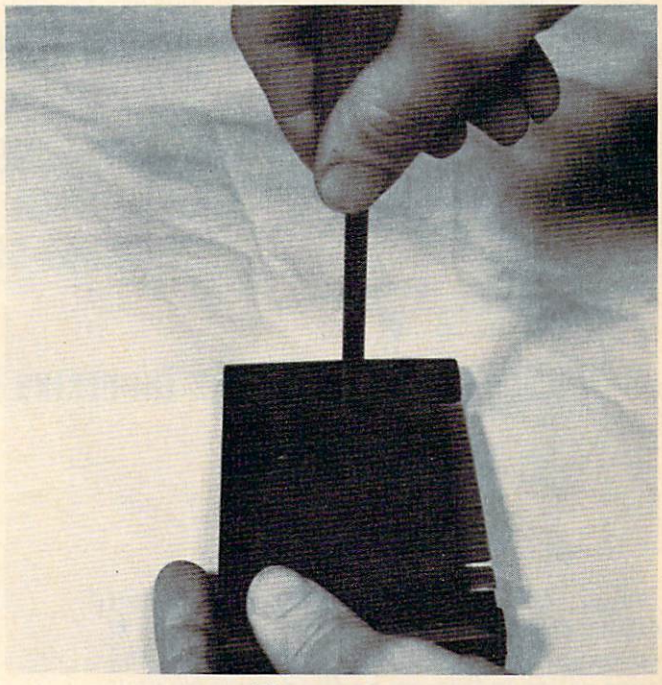


Figure 3

3) You should have three parts in your hands now: a case bottom, a case top and the circuit board. Set both case parts aside temporarily and concentrate on the circuit board.

4) Locate the dip switch assembly near the fingers of the circuit

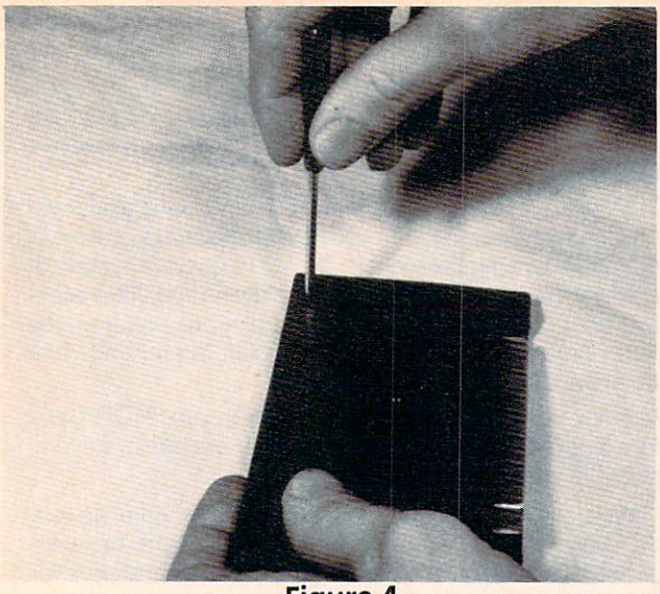


Figure 4

board. Using a solder bulb and wick, carefully desolder and remove completely. You may throw this dip switch assembly into your junk box, for we won't be using it at all in the final design. Underneath the dip switch you should find a pad arrangement like that shown in Figure six. For reference sake, notice that these pads give us access to the RAM chip select, the ROM chip select, the +5V line and the BLK5 line. These are the four connections we need to implement the new switch assembly as shown in Figure one.

5) Still using the bulb and wick, remove the solder filler from the four empty twenty-four pin connectors. Refer to Figure seven. We will be installing the sockets for the 2716's here later on.

6) Likewise, remove the solder from the holes provided for the four decoupling capacitors. These are located at the head of each of the four empty regions mentioned in step 5. We will add capacitors here in a later step.

7) Refer again to Figure six. Using a sharp razor knife, carefully cut the bridge between the two pads as indicated. Exercise care not to slash either your fingers or the circuit board!

8) Using Figure eight as a guide, carefully cut the trace coming from pin 21 of integrated circuit U4. Note that the far side of this trace is not needed for anything further, but the side closest to pin 21 will be tied to another point in a later step. Call this point P.

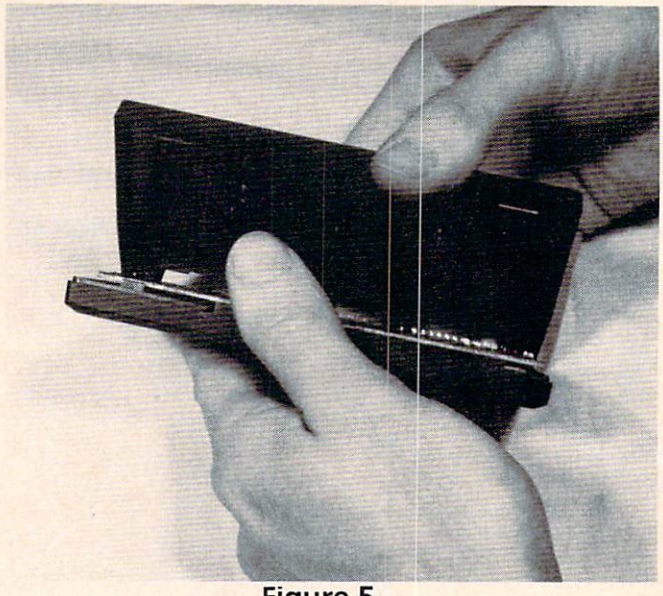
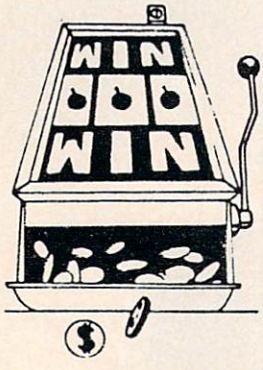


Figure 5

SUPERIOR GRAPHICS EMPORIUM



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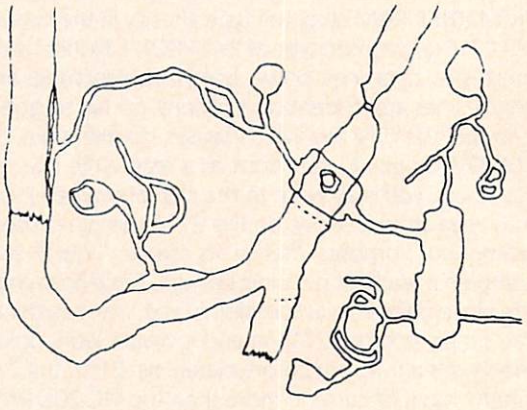

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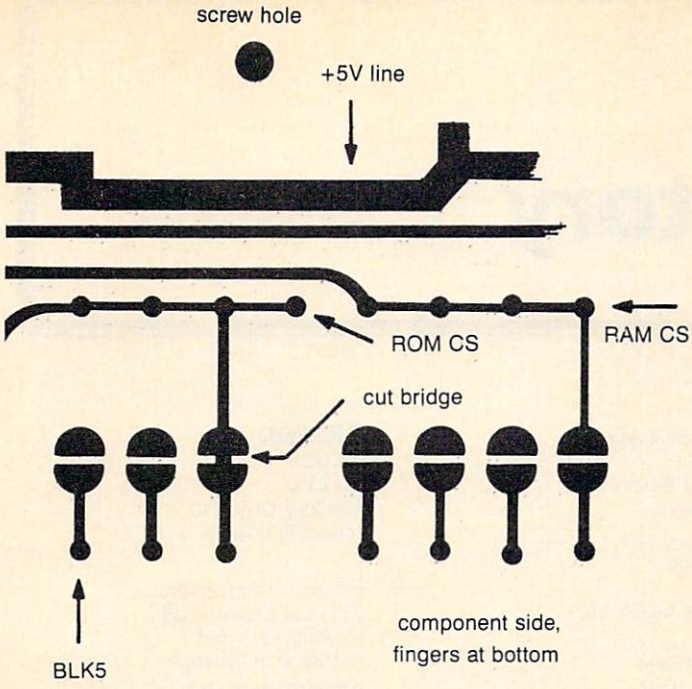

FIGURE 6

9) Now refer to Figure nine. Using the razor knife again, carefully cut the trace running to finger number 17. Note that the point closest to the finger is designated Q. We will connect point Q to P (as mentioned in step 8).

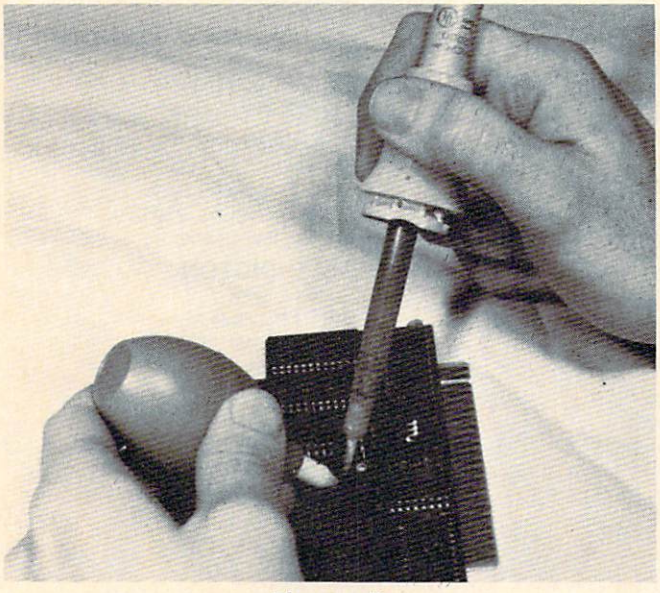

Figure 7

10) Using a piece of insulated hookup wire, connect points P and Q. Route the wire in such a way as to avoid obscuring the single screw hole in the circuit board and make certain that your solder joints are dainty and clean. Since the circuit board employs a solder mask, you will have to scrap it away slightly at both points P and Q before soldering. Use a razor knife for this purpose, but be careful not to cut into the board. The modification we have just performed insures that the R/W line from the computer goes only to the RAM chips, not the ROM.

11) As mentioned earlier, the Vpp pins of the 2716 need to be tied to +5V. Refer to Figure nine again. Using a piece of bare bus wire, bridge the point indicated to the +5V line. Once again, you will have to scrape a bit of the solder masking off to facilitate this. Keep your connection small since a socket will be mounted on top of this in the next step.

12) Instal four low profile twenty-four pin sockets in the holes cleared in step 5. Use good soldering practices and avoid excessive heat which may cause traces to lift up or the sockets to melt.

13) Install four .01 mfd capacitors in the holes cleared in step 6. At this point your board should look like Figure ten.

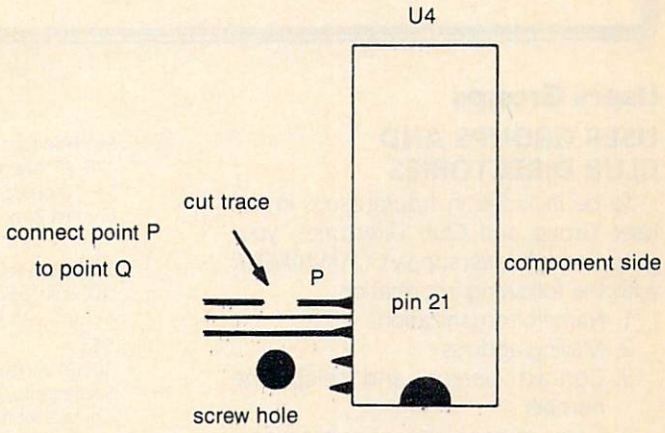

FIGURE 8

14) We can now install the switch, but just how you do this depends on the size and type of switch you locate. The 8K RAM package is housed in rather cramped quarters and I had trouble finding a DPDT switch small enough to mount in the plastic box. The solution I came up with is illustrated in Figure eleven. The switch is actually mounted on the outside of the box using epoxy cement to build up the region. The wires connecting to it run through a hole in the box right below where it is mounted as illustrated in Figure twelve. Although the affair looks strange, it does work well and the epoxy is as strong as the box. You're on your own here; pick the switch you intend to use and decide upon a mode of fastening it. After installing the switch, use a length of ribbon cable to connect the six terminals of the switch to the various pads illustrated in Figure six. Use Figure one as your master wiring guide.

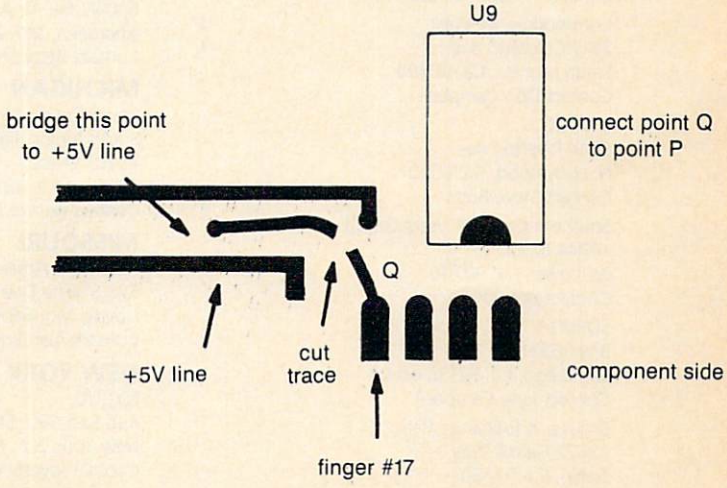

FIGURE 9

User Groups & Clubs Directory

Users Groups

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1. Name of organization
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Explorations with Assembly Language

by Eric Giguere

This month we're going to sidetrack from our current discussion of the KERNAL and take a look at a useful application of an assembly language routine. We're going to dissect a program I created called Screen Dump, which dumps (copies) a high-resolution picture from the 64 to a 1525 printer. Its actual use is detailed elsewhere in *COMMANDER,* in the accompanying article "SCREEN DUMP 64".

THE PROBLEM

I wanted to dump some of my hi-res pictures to the printer so I decided to create my own program. This was not as easy as it sounds. The 1525 (or MPS 801) has a hi-res mode (dot-addressable graphics is the proper term) but it differs from the way hi-res pictures are stored in the 64's memory. As you can see by looking at Figure 1, one printer line is 480 dots (pixels) wide by 7 dots high. You're probably saying that because a hi-res picture is 320 pixels wide by 200 pixels high it should be easy to copy the picture to the printer. If a hi-res picture was stored in the same fashion as the printer prints its graphics—left to right, 1 dot wide and 7 dots high—this would be true. But if you take a look at Figure 2, you'll see that it's not. It shows the memory arrangement for a hi-res picture. As would be expected, the first 8 pixels of the picture are stored in the first byte of picture memory (each bit in the byte represents one pixel). The next byte should hold the 8 pixels to the right, true? False. The next byte (byte 2) holds the 8 pixels underneath the first 8, and the third holds the 8 underneath those, and so on, until we reach the ninth byte. Instead of holding the eight pixels underneath the eighth byte, it holds the eight pixels to the right of the first byte.

In effect, the first eight bytes hold all the pixels from 0,0 to 7,7 (values are given in the format X,Y and usually start from 0 instead of 1). The next eight bytes hold the pixels from 8,0 to 15,7 and so on. When the right side of the screen is reached 8 is added to the Y-value and the cycle starts over with an X-value of 0. If this isn't enough, we can't send a full byte to the printer at once, since it will only print 1 dot horizontally and 7 vertically at a time. We are forced to send the separate bits one at a time, in the proper order. Not an easy task!

THE PROGRAM

Program 1 is my solution to the problem (actually an incomplete solution). When it prints out a hi-res picture, it only prints the first seven pixels down, skipping the eight (see Figure 3). Why do I do this? Mainly because it makes keeping track of where we are in memory much easier. If we printed each and every pixel in the picture the program would be beyond the scope of this column.

FIRST STEPS

We first have to define all the memory locations and values we will be needing. Lines 3 to 8 of the listing take care of this. Two KERNAL routines are going to be used in this program: CHROUT and STOP. CHROUT is the routine that outputs a character to the device currently OPENed (in our case it will be the printer) and STOP is the routine that checks to see if the STOP key is being depressed. We will use XLO and XHI to keep track of our X-location (we need two bytes because there are 320 pixels horizontally) and YLOX to keep track of our Y-location. Finally, OUT is the character we'll send to the printer.

INITIALIZATION

Lines 10 to 12 store the first eight powers of 2 into memory, as we'll be needing them later. Now comes the program. First we initialize the Y-pointer and then the X-pointer. The Y-pointer will only be cleared once but the X-pointer will be cleared each time we start a new printer line. Lines 19 to 24 are used to adjust the left margin of the printout by printing a number of blank dots before the picture. The X-register is decreased until it is less than zero, after which it will branch to NEWCOL. Otherwise it will print a blank dot (128 to the printer) and then loop back. As it's set right now the program won't print any blank dots before the picture but a POKE to $034F would change that. SCREEN DUMP 64 does that to control the margin.

MAIN CODE

The main code of the program resides in lines 25 to 44. These take a value from memory, AND it with a value from the powers of 2 table at the beginning and store this in OUT. The AND makes sure we get the bit we want. We check to see if the byte equals zero or not and set the carry accordingly, rotating it through OUT. This will properly set the bits in OUT so that the printer can print the picture. The EOR #$FF reverse the picture (changing this to an EOR #$00 leaves it unchanged) and the ORA #128 is needed to make sure the printer doesn't take our byte as a command. JSR CHROUT sends the character to the printer, after which we check to see if we have finished all eight bits in the bytes. If not, we jump back to INITX and repeat the process.

After we're finished sending that 8 by 8 block of pixels we bump up the pointer at NEXTBYT by 8 as well as the X-pointer. If we've reached $140 (320) we send a carriage return to the printer and increase the Y-pointer, checking to see if we have finished all 200 pixels down (25 lines). If not, we start over, but if we are finished, the program resets the pointer at NEXBYT to $6000 and does an RTS.

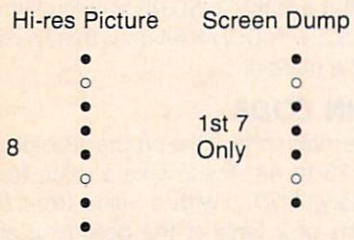
CONTROL POINTS

One thing about this program is its flexibility. By changing several locations the screen dump can be modified. Location 847 ($034F) controls how many blank pix-

FIGURE 2

Byte1	Byte9
2	10
3	11
4	12
5	13
6	14
7	15
8	16
321	329

FIGURE 3



els are to be printed before the actual dump. Location 885 ($0375) controls whether the picture will be printed in reverse or not. A 255 here reverses the picture and a 0 leaves it as it is (try using values in between and see what happens). The last modification you can do, and perhaps the most important, is to change the starting address for the screen dump. Locations 866 ($0362) and 960 ($03C0) have to hold the low-byte of the address and locations 867 ($0363) and 955 ($03BB) must hold the high-byte. As the program is listed it will dump a picture from location $6000, the start of a standard KoalaPad picture. To output other pictures you simply change the proper locations, as in SCREEN DUMP 64.

OPEN THE FILE

Before you can use Screen Dump you must open a file to the printer, tell it to go into graphics mode and then direct all output to this file. Doing this from assembly language is a hassle, so do it from BASIC first. Before activating Screen Dump type the following:

OPEN 4,4: PRINT#4,CHR$(8);: CMD4

This will set everything up and you can now do a SYS 836 to activate the routine.

ERROR, ERROR!

Before leaving this month's column I want to note an error that appeared in the EDIT/ASM updates on page 124 in the March issue of *COMMANDER*. Line 3190 should read "THEN Y=2", not "THEN Y=1". Also, you should change line 3235 in the assembler to read "IFT 5" instead of "IFT 4". I hope these are the final updates and corrections! Commodore 64 owners who find their version of EDIT/ASM too slow for their needs can now purchase the new EDIT/ASM II from Abacus Software (in Canada contact King Microware Ltd.). Not only is it faster (it's compiled), but I've added some new commands and included a 60-page manual to help you use the program. Best of all, it's completely compatible with your old EDIT/ASM disk files. Unfortunately, EDIT/ASM II will not work on the VIC, but if there is enough demand for a VIC version perhaps I will publish one.

NEXT MONTH

Next month we'll get back to our explorations of the KERNAL and talk about printing characters to the screen and getting input from the user. Any questions or comments can be sent to me at: Eric Giguere, c/o *COMMANDER* Magazine, P.O. Box 98827, Tacoma, WA 98498.

```
FILENAME: SCREEN DUMP.OBJ

LINE ADDR   CODE      LABEL   OPC OPERAND        COMMENTS
---- ----   ----      -----   --- -------        --------

0001 033C              ORG $033C
0002 033C           ;
0003 033C           CHROUT EQU $FFD2          ;OUTPUT CHARACTER
0004 033C           STOP   EQU $FFE1          ;CHECK STOP KEY
0005 033C           XLO    EQU 250            ;X-POSITION LOW BYTE
0006 033C           XHI    EQU 251            ;X-POSITION HIGH BYTE
0007 033C           YLOC   EQU 252            ;Y-POSITION
0008 033C           OUT    EQU 253            ;OUTPUT VALUE
0009 033C           ;
0010 033C 80 40 20  TABLE  BYT 128,64,32
0011 033F 10 08 04         BYT 16,8,4
0012 0342 02 01            BYT 2,1
0013 0344           ;
0014 0344 A9 00            LDA #0             ;INITIALIZE Y-POINTER
0015 0346 85 FC            STA YLOC
0016 0348 A9 00     NEWLIN LDA #0             ;INITIALIZE X-POINTER (NEW LINE)
0017 034A 85 FA            STA XLO
0018 034C 85 FB            STA XHI
0019 034E A2 00            LDX #0             ;PRINT BLANK SPACES BEFORE
0020 0350 CA        NEXTSP DEX                ;ACTUAL SCREEN DUMP
0021 0351 30 07            BMI NEWCOL         ;IF X<0 THEN LEAVE
0022 0353 A9 80            LDA #128           ;PRINT BLANK CHARACTER
0023 0355 20 D2 FF         JSR CHROUT
0024 0358 D0 F6            BNE NEXTSP
0025 035A A0 00     NEWCOL LDY #0             ;START NEW 8-BIT COLUMN
0026 035C A2 00     INITX  LDX #0
0027 035E 8A               TXA
0028 035F 85 FD            STA OUT            ;CLEAR OUT
0029 0361 BD 00 60  NEXBYT LDA $6000,X        ;GET BYTE
0030 0364 39 3C 03         AND TABLE,Y        ;MASK PROPER BIT
```

```
0031 0367 18              CLC
0032 0368 F0 01           BEQ CHECK
0033 036A 38              SEC                    ;IF ACC<>0 THEN SET CARRY
0034 036B 66 FD   CHECK   ROR OUT                ;MOVE CARRY INTO OUT
0035 036D E8              INX
0036 036E E0 08           CPX #8                 ;8 BITS YET?
0037 0370 D0 EF           BNE NEXBYT
0038 0372 A5 FD           LDA OUT                ;GET OUTPUT CHARACTER
0039 0374 49 FF           EOR #$FF               ;REVERSE IT (#0 = NO REVERSE)
0040 0376 09 80           ORA #128               ;MAKE SURE HIGH BIT IS ON
0041 0378 20 D2 FF        JSR CHROUT             ;SEND IT OUT
0042 037B C8              INY
0043 037C C0 08           CPY #8                 ;DONE ALL 8 HORIZON. BITS?
0044 037E D0 DC           BNE INITX
0045 0380              ;
0046 0380 20 E1 FF        JSR STOP               ;CHECK STOP KEY
0047 0383 F0 35           BEQ QUIT
0048 0385              ;
0049 0385 18              CLC
0050 0386 AD 62 03        LDA NEXBYT+1
0051 0389 69 08           ADC #8                 ;ADD 8 TO SCREEN POINTER
0052 038B 8D 62 03        STA NEXBYT+1
0053 038E AD 63 03        LDA NEXBYT+2
0054 0391 69 00           ADC #0
0055 0393 8D 63 03        STA NEXBYT+2
0056 0396 18              CLC
0057 0397 A5 FA           LDA XLO
0058 0399 69 08           ADC #8                 ;DO THE SAME FOR X-POINTER
0059 039B 85 FA           STA XLO
0060 039D A5 FB           LDA XHI
0061 039F 69 00           ADC #0
0062 03A1 85 FB           STA XHI
0063 03A3 A5 FA           LDA XLO                ;CHECK X-POINTER TO SEE IF
0064 03A5 C9 40           CMP #$40               ;IT HAS PASSED $140
0065 03A7 90 B1           BCC NEWCOL
0066 03A9 A5 FB           LDA XHI
0067 03AB F0 AD           BEQ NEWCOL
0068 03AD A9 0D           LDA #$0D               ;IT HAS, PRINT A RETURN
0069 03AF 20 D2 FF        JSR CHROUT
0070 03B2 E6 FC   YCHECK  INC YLOC
0071 03B4 A5 FC           LDA YLOC
0072 03B6 C9 19           CMP #$19               ;CHECK TO SEE IF DONE 25 LINES
0073 03B8 D0 8E           BNE NEWLIN
0074 03BA A9 60   QUIT    LDA #$60               ;RESTORE OLD VALUE
0075 03BC 8D 63 03        STA NEXBYT+2           ;TO POINTER
0076 03BF A9 00           LDA #0
0077 03C1 8D 62 03        STA NEXBYT+1
0078 03C4 60              RTS

ASSEMBLY COMPLETE.


SYMBOL TABLE:

CHROUT=$FFD2   STOP---$FFE1   XLO----$00FA   XHI----$00FB   YLOC---$00FC
OUT----$00FD   TABLE--$033C   NEWLIN-$0346   NEXTSP-$0350   NEWCOL-$035A
INITX--$035C   NEXBYT-$0361   CHECK--$036B   YCHECK-$03B2   QUIT---$03BA


PROGRAM START: $033C     PROGRAM END: $03C5
```

Screen Dump 64

By Eric Giguere

A Commodore 64 armed with a KoalaPad and the Koala Painter program can provide an amazing foray into the world of computer graphics. This is also true of the many other computer "drawing" programs on the market. But once you've created your masterpiece and have it safely stored away on disk, what do you do? You can't very well show off the disk, saying "I made that" or carry your computer with you. The best way to impress others would be to have a printed copy of your creation. You can do this by either 1) buying a commercial program, or 2) typing in Screen Dump 64.

REQUIREMENTS

If you want to use Screen Dump 64 you're going to need three things: a Commodore 64, a disk drive, and a 1525 or MPS-801 printer. You can even use a different brand of printer if you have an interface that emulates a 1525. Type in the program accompanying this article and save it on disk, in case you made an error typing it in. You are now ready to try out the program, so make sure you have a hi-res picture handy.

THE MENU

When you RUN the program the screen will clear and a menu will appear. Screen Dump 64 has eight options, all (except the last) being accessed by pressing one of the function keys on the right side of the computer. The function keys allow you to load and print a picture, change picture tabbing, print the picture in reverse and get a disk directory. To quit the program simply hit the letter 'Q' (if this is done accidentally, simply RUN the program again). Let's take a look at the options.

F1-DUMP PICTURE

Hitting F1 causes the hi-res picture currently in memory to be copied or "dumped" to the printer. Pressing any key interrupts the printing and returns you to the menu. Use the other function keys to set the options you want before printing.

F2-PICTURE SPACING

F2 is used to specify the number of "dots" to move before printing the picture, allowing you to print it anywhere on the page. The old value will be displayed and you will be asked to input the new value (if you don't want to change it simply re-type the old value). Six dots is equivalent to one normal printed character, so to move the picture 5 characters to the right you would enter a value of 30 (5 x 6 = 30). A value of 0 will print the picture flush with the left margin.

F3-REVERSE ON/OFF

Typing F3 controls whether or not the picture will be printed in reverse (black changed to white and white changed to black). Initially reverse mode is turned on so hit F3 to turn it off and press a key to return to the menu. To turn it back on simply hit the F3 key once more.

F4-DISK DIRECTORY

This option lists all the programs on disk in case you forget the name of your picture. Pressing the space bar returns you to the menu while holding down a key freezes the listing until you release it.

F5-LOAD KOALAPAD PICTURE

This option loads a picture created with the Koala Painter program into memory. When it asks you to enter the name of the picture, type in the appropriate letter of the alphabet, a space and the rest of the name. For example, to load PIC B EXAMPLE you would first hit F5 and see this prompt:

```
PIC ( )
```

The '( )' represents the cursor, so just type in the sequence 'B EXAMPLE' and press RETURN. Once loaded the picture will be displayed on the screen so that you may verify that it is the proper picture. Press the SHIFT key and release it to return to the menu. (The display routine was taken from the Koala Painter manual.)

F7-LOAD OTHER PICTURE

This is exactly the same as F5 except that it allows you to load in pictures other than ones created with Koala Painter. You will be prompted for the complete name and once the picture is loaded you will be returned to the main menu (there are so many different methods of storing the pictures in memory that it would be impossible to include display routines for each and every one).

Be sure to use option F8 before dumping pictures loaded in this fashion.

F8-CHANGE DUMP ADDRESS

A KoalaPad picture is stored in memory starting at location 24575 but pictures loaded with option F7 may be stored elsewhere. Hit F8 and enter the address where the first byte of the picture is stored. The old value will be displayed for you at the top of the screen. If you don't want to change it simply re-enter it as the new value and press RETURN. Program 2 can be used to find the starting address of most high-resolution pictures. Simply load and run it, entering the name of the picture you want checked. Jot down the value and use it when you re-load Screen Dump 64. For example, the hi-res picture "KAREN" that comes on the C64 demo disk starts out at 8192. Load it with F7 and then use F8 to change the dump address to 8192. Figure 1 is the result of that dump.

LIMITATIONS

Although Screen Dump 64 is quite versatile, it is also somewhat limited. If you take a close look at the examples I've included you'll notice how squat the pictures seem. This is because the program will only print the first 7 out of every 8 pixels (dots) down the screen (to find out why you can turn to this month's "Explorations With Assembly Language"). Since pictures are 200 pixels high, in effect you lose 25 of these in the printout, resulting in that "pancake" look.

HOW IT WORKS

The actual work of Screen Dump 64 is done by a small assembly language routine I created (for an explanation of

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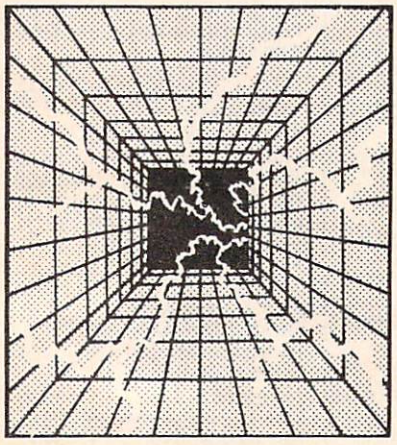
how it works see "Explorations With Assembly Language"). When I first created it I used to load the pictures manually with the LOAD command and then activate the routine. Now the BASIC program does all the work for you. Feel free to alter it as you like, but make sure you don't change the basic structure, especially lines 40-95.

FINAL NOTES

I hope you will enjoy using Screen Dump 64 as much as I do. Any questions or comments can be sent to me at: Eric Giguere, *c/o COMMANDER* Magazine, P.O. Box 98827, Tacoma, WA, 98498.



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```
 10 REM ******************
 12 REM *                *
 14 REM * SCREEN DUMP 64 *
 16 REM *                *
 18 REM *   COPYRIGHT    *
 20 REM *     (C)1984    *
 22 REM *                *
 24 REM *        BY      *
 26 REM *                *
 28 REM *  ERIC GIGUERE  *
 30 REM *                *
 32 REM ******************
 34 REM
 36 :
 40 POKE 53280, 14: POKE 53281, 1: KP$=CHR$(
    129)
 45 IF PEEK(828)=128 AND PEEK(49154)=173 THE
    N 80
 50 RESTORE: FOR I=828 TO 964: READ J: POKE
    I,J: NEXT
 60 FOR I=49154 TO 49317: READ J: POKE I,J:
    NEXT
 80 IF KP=0 THEN 100
 85 SYS 49154: WAIT 653,1: WAIT 653,1,1
 90 POKE 53265,PEEK(53265)AND223: POKE 53272
    , (PEEK(53272)AND240)OR4
 95 PRINT""[clr]"": RUN
 97 REM
 98 REM ** MENU **
 99 REM
100 KP=0: PRINT ""[clr][down][blk][sp, 2 tim
    es]SCREEN[sp]DUMP[sp]64[sp]-[sp]COPYRIGH
    T[sp]1984[sp]BY""
110 PRINT TAB(13)""[down]ERIC[sp]GIGUERE""
120 PRINT""[down, 2 times][right][blk]F1[sp]
    [blu]DUMP[sp]PICTURE""
130 PRINT""[down][right][blk]F2[sp][blu]CHAN
    GE[sp]PICTURE[sp]SPACING""
140 PRINT""[down][right][blk]F3[sp][blu]TOGG
    LE[sp]REVERSE[sp]ON/OFF""
150 PRINT""[down][right][blk]F4[sp][blu]DISK
    [sp]DIRECTORY""
160 PRINT""[down][right][blk]F5[sp][blu]LOAD
    [sp]KOALAPAD[sp]PICTURE""
170 PRINT""[down][right][blk]F7[sp][blu]LOAD
    [sp]OTHER[sp]PICTURE""
180 PRINT""[down][right][blk]F8[sp][blu]RESE
    T[sp]DUMP[sp]ADDRESS""
190 PRINT""[down][right]HIT[sp][blk]"Q"[blu]
    [sp]TO[sp]QUIT""
200 PRINT""[down, 2 times][right][com-7]PLEA
    SE[sp]ENTER[sp]YOUR[sp]SELECTION""
210 WAIT 197,64,64: GET A$: IF A$=""Q"" THEN
     PRINT ""[clr]"": END
220 IF A$<CHR$(133) OR A$>CHR$(140) THEN 210
230 PRINT""[clr]"": ON ASC(A$)-132 GOTO 250,
     300, 350, 400, 500, 600, 210, 550
247 REM
248 REM ** DUMP PICTURE **
```

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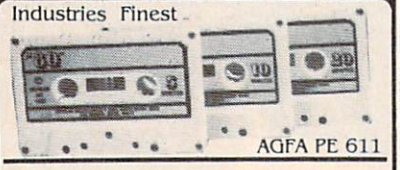

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```
249 REM
250 OPEN 4,4: CMD 4: PRINT CHR$(8);
260 SYS 836
270 PRINT#4: CLOSE 4: GOTO 100
297 REM
298 REM ** TOGGLE REVERSE MODE **
299 REM
300 R=PEEK(885): M=0: IF R=0 THEN M=255
310 PRINT ''[down][right]REVERSE[sp]MODE[sp]
    IS[sp]NOW[sp]'';:IF M THEN PRINT ''ON.''
    : GOTO 330
320 PRINT ''OFF.''
330 POKE 885,M: PRINT''[down, 3 times][right
    ]HIT[sp]ANY[sp]KEY[sp]TO[sp]CONTINUE''
340 WAIT 197,64,64: GET A$: GOTO 100
347 REM
348 REM ** LOAD KOALAPAD PICTURE **
349 REM
350 PRINT''[down, 2 times]ENTER[sp]FILENAME:
    ''
360 PRINT''[down][right, 2 times]PIC[sp]'';:
     GOSUB 1000: IF N$=''QUIT'' THEN 100
370 KP=1: F$=LEFT$(KP$+''PIC[sp]''+N$+''[sp,
     10 times]'',15): LOAD F$,8,1
397 REM
398 REM ** LOAD OTHER PICTURE **
399 REM
400 PRINT''[down, 2 times][right]ENTER[sp]FI
    LENAME:[down, 2 times]''
410 GOSUB 1000: IF N$=''QUIT'' THEN 100
420 LOAD N$,8,1
497 REM
498 REM ** CHANGE SPACING **
499 REM
500 PRINT''[down][blk][right]PRESENT[sp]SPAC
    ING[sp]IS'';PEEK(847)
510 PRINT''[down, 2 times][right]ENTER[sp]TH
    E[sp]NEW[sp]VALUE[sp](0-255):[sp]'';: GO
    SUB 1000
520 IF N<0 OR N>255 THEN PRINT ''[clr]'': GO
    TO 500
530 POKE 847, N: GOTO 100
547 REM
548 REM ** RESET DUMP ADDRESS **
549 REM
550 PRINT''[down, 2 times]PRESENT[sp]LOAD[sp
    ]ADDRESS[sp]IS'';PEEK(867)*256+PEEK(866)
560 PRINT''[down, 2 times]ENTER[sp]NEW[sp]AD
    DRESS:[sp]'';: GOSUB 1000: IF N<0 OR N>6
    5535 THEN 100
570 N%=N/256: N=N-N%*256: POKE 867,N%: POKE
    955, N%
580 POKE 866,N: POKE 960,N: GOTO 100
597 REM
598 REM ** DISK DIRECTORY **
599 REM
600 OPEN 15,8,15,''I0'':OPEN4,8,0,''$0'':NU$
    =CHR$(0)
601 GET#4,A$,A$
602 GET#4,A$,A$
```

```
605 IFA$=''''THEN665
610 GET#4,A$,B$
620 PRINTASC(A$+NU$)+ASC(B$+NU$
    )*256;
630 GET#4,A$
640 IFA$=''''THENPRINT:GOTO602
650 PRINTA$;
652 GETA$:IFA$=''[sp]''THEN665
655 WAIT197,64
660 GOTO630
665 WAIT 197,64,64: GET A$
670 PRINT: CLOSE 4: CLOSE 15: G
    OTO 100
797 REM
798 REM ** ML DATA **
799 REM
800 DATA 128, 64, 32, 16, 8, 4,
     2, 1, 169, 0, 133, 252, 16
    9, 0
805 DATA 133, 250, 133, 251, 16
    2, 0, 202, 48, 7, 169, 128,
     32, 210, 255
810 DATA 208, 246, 160, 0, 162,
    0, 138, 133, 253, 189, 0,
    96, 57, 60
815 DATA 3, 24, 240, 1, 56, 102
    , 253, 232, 224, 8, 208, 23
    9, 165, 253
820 DATA 73, 255, 9, 128, 32, 2
    10, 255, 200, 192, 8, 208,
    220, 32, 225
825 DATA 255, 240, 53, 24, 173,
     98, 3, 105, 8, 141, 98, 3,
     173, 99
830 DATA 3, 105, 0, 141, 99, 3,
     24, 165, 250, 105, 8, 133,
     250, 165
835 DATA 251, 105, 0, 133, 251,
     165, 250, 201, 64, 144, 17
    7, 165, 251, 240
840 DATA 173, 169, 13, 32, 210,
     255, 230, 252, 165, 252, 2
    01, 25, 208, 142
845 DATA 169, 96, 141, 99, 3, 1
    69, 0, 141, 98, 3, 96
850 DATA 173, 17, 208, 41, 239,
     141, 17, 208
855 DATA 162, 127, 160, 64, 32,
     156, 192, 162
860 DATA 4, 160, 0, 32, 161, 19
    2, 162, 131
865 DATA 160, 39, 32, 114, 192,
     162, 131, 160
870 DATA 40, 32, 156, 192, 162,
     216, 160, 0
875 DATA 32, 161, 192, 162, 135
    , 160, 15, 32
880 DATA 114, 192, 173, 16, 135
    , 141, 33, 208
```


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```
885 DATA 173, 17, 208, 9, 34, 1
    41, 17, 208
890 DATA 173, 22, 208, 41, 223,
    9, 16, 141
895 DATA 22, 208, 173, 24, 208,
    9, 8, 141
900 DATA 24, 208, 162, 96, 160,
    0, 32, 156
905 DATA 192, 162, 32, 160, 0,
    32, 161, 192
910 DATA 162, 127, 160, 63, 32,
    114, 192, 173
915 DATA 17, 208, 9, 16, 141, 1
    7, 208, 96
920 DATA 142, 1, 192, 140, 0, 1
    92, 160, 0
925 DATA 177, 251, 145, 253, 16
    5, 252, 205, 1
930 DATA 192, 208, 8, 165, 251,
    205, 0, 192
935 DATA 208, 1, 96, 230, 251,
    208, 2, 230
940 DATA 252, 230, 253, 208, 22
    7, 230, 254, 76
945 DATA 122, 192, 134, 252, 13
    2, 251, 96, 134
950 DATA 254, 132, 253, 96
997 REM
998 REM ** INPUT ROUTINE **
999 REM
1000 OPEN 1,0: INPUT#1, N$: CLOS
   E 1: N=VAL(N$): PRINT: RETURN
```


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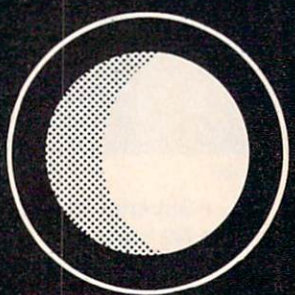

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LESSON 4

THE GOTO STATEMENT

1) So far the simple programs you have typed in follow one step after another. That's good, because those programs are easy to read and understand. Here's another way to write programs:

```
10 GOTO 120
20 PRINT "SENSE WHEN"
30 GOTO 140
40 PRINT "CAREFULLY,"
50 GOTO 100
60 PRINT "WHEW!"
70 END
80 PRINT "RUN IT."
90 GOTO 60
100 PRINT "IT WILL MAKE"
110 GOTO 20
120 PRINT "IF YOU"
130 GOTO 160
140 PRINT "YOU FINALLY"
150 GOTO 80
160 PRINT "TYPE THIS IN"
170 GOTO40
```

Run this program and see if it really does make sense.

2) Of course, there would be an easier way of making the computer say what it did in that program, and what it said wasn't really worth saying in the first place. This is a great example of a really poor program; professional programmers call this spaghetti code. It breaks what you could call

THE GOLDEN RULE OF PROGRAMMING:

A program should be as easy for a person to understand as it is for a computer to understand.

If you think about it, it's going to be hard for a person to follow the program if it's jumping around from one line to another. GOTO statements make programs hard to read and should be avoided when you can. Later lessons will show you how to write well, without saying too much on GOTO.

There's a sort of joke among programmers that you can judge the quality of a program by the number of GOTO statements it uses. By that rule, the program you just typed in is exceptionally poor!

3) Here's an example of a slightly more useful and much more interesting program:

```
NEW
10 INPUT "WHAT'S YOUR NAME"; N$
20 PRINT N$ + " "·
30 GOTO 20
```

Run this program. It will give you some idea of how fast the computer can work — and printing things on the screen is one of the slowest things it does!

The trouble is, this program puts the computer into an endless loop. Every time it passes line 20, it goes to line 30, but as soon as it arrives at line 30, it is sent back to line 20. There are two ways to make it come to an end. One is to turn the computer off; a much better way is to break into the computer's cycle. Do that by pressing the STOP key. Any time the computer is in an endless loop, STOP will get you back into control.

To review a little, please answer these two questions:

Why is there a space between the quotation marks in line 20? _____

What does the semicolon do at the end of line 20? _____

4) The GOTO statement is most useful for letting the computer make a simple decision. Type in this program to see how.

```
NEW
10 PRINT "PICK A NUMBER FROM 1 TO 5!"
20 INPUT X
30 ON X GOTO 100,200,300,400,500
100 PRINT "YOU PICKED 1. THAT'S NOT MUCH OF A
    NUMBER."
110 END
200 PRINT "YOU PICKED 2. NOT MANY PEOPLE
    PICK 2."
210 END
300 PRINT "YOU PICKED 3. MORE PEOPLE PICK 3
    THAN ANY OTHER NUMBER."
310 END
400 PRINT "YOU PICKED 4. 4 IS A STUPID NUMBER."
410 END
500 PRINT "YOU PICKED 5. THAT'S ONE OF MY
    FAVORITES."
510 END
```

Run this program several times. Pick a different number each time and see what happens.

The key to this program is in line 30, the words ON GOTO. That means, depending ON what value X has, the computer will GOTO one of the numbers that follow. There are five choices for X, and five places to go to. If you pick 1 for X, the computer will go to line 100. If you pick 3, the computer will go to line 300. What will happen if you pick 5?

What would happen if lines 110, 210, 310, 410, and 510 were left out? _____

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HOW DID YOU DO?

Answers to lesson four questions:

3) The space between quotation marks makes the computer print a space after your name each time the name is printed. The semicolon makes the computer keep printing on the same line; technically, it suppresses the carriage return that normally occurs with a PRINT statement. Try running the program with a comma in place of the semicolon, or with no punctuation in that spot at all.

4) The computer jumps to line 500, because that is the fifth choice you gave it in line 30.

This is an important question! The END statements are necessary to keep the computer from running over into other options that were not selected. If these lines were left out and you picked 2, say, then the computer would print the expected response for 2, but would also print responses for choosing 3, 4, or 5!

The answers to lesson 3 were inadvertently omitted from the May issue.

Answers to lesson three questions:

1) This is an important one. RUN makes the computer actually do the program, and LIST makes the computer show you the steps in the program.

3) Line 20 only, lines 20 and 30 (plus any other lines that might have been between 20 and 30), all lines from the beginning through line 30, line 30 and all lines following it.

5) String variables end in dollar signs. NUM$ would be a string variable, but NUM is a numeric variable.

?REDO FROM START means the computer was expecting numeric input, and you gave it letters instead.

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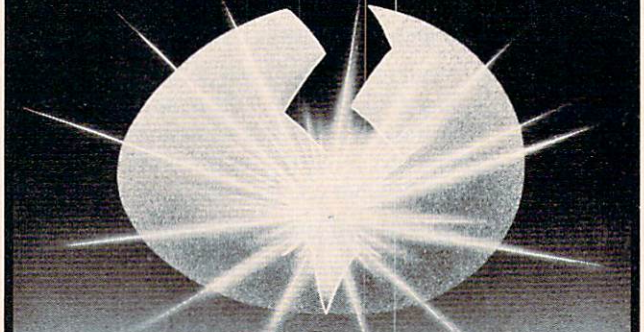

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Functionally Yours . . .

By Ian Adam

The VIC 20 and the Commodore 64 feature four large function keys on the right side of the keyboard. At first blush, these keys appear to serve no purpose. This article provides an easy method of using them, from BASIC, that is both straightforward and effective. This approach will be of interest to all users of the VIC and the 64, and is particularly oriented toward the beginning or intermediate-level programmer.

So you bought a VIC-20 or C-64 recently . . . and you are most impressed with your good judgement. Your Commodore has great graphics, sound, built-in BASIC, and all those programming applications. But what really sold you on the machine, the one extra feature that cinched the deal, was the four special function keys on the right, and the promise of all the wonderful things they could do.

The only trouble is, when you open up the box and fire up the computer, those function keys do not seem to work! When you press them nothing happens–games do not spring to life, the computer does not balance your checkbook, the technological revolution does not sweep your home. In fact, the computer just does not seem to react at all, since nothing appears on the screen. Perhaps you feel like you are knocking at the wrong door.

So–back to the computer store, and track down an *EXPERT*, and ask him how the devil these little function keys are supposed to work. Aha, he tells you, it is simple. All you need is an auto-boot machine-code program structured on a selective interrupt-enable routine, in order to transfer internal system control of the microprocessor to the addressable code sequence of your choosing.

Simple, right? Well, here is some good news. It does not have to be that difficult–those keys do in fact work, and you can program them very easily yourself. You will find that they can be extremely useful, and have many practical applications in programs that you write.

When you write an interactive program, there are several ways of getting a response from the user. One way is to issue a user's manual, and expect the user to know what to do and when. A better way is to print a 'menu', or list of options, on the screen. The user then knows exactly what his options are, and indicates his choice by pressing one of the function keys. A large program may have several menus; there will be a main menu that selects a general area of the program. Each area will then have sub-menus for more detailed information, or the user can return to the main menu at any time. This type of program is very 'friendly.'

DO THEY REALLY WORK?

Probably the most frustrating thing about the function keys is that, when you press them, nothing appears on the screen. So, let us start by proving that they really do work. Press shift-2 to get a single quotation mark; this puts your computer into what is known as 'quote mode'. Sounds rather like a politician in an election year. Now we find that the function keys do work–press them and see graphics characters appear on the screen. Nothing else happens . . . but at least we can set our fears to rest, knowing that the keys are not defective. (For the even-numbered functions F2 to F8, you have to hold down the shift key while pressing the function keys).

In order to see how the function keys are worked into a program, we will divide the process into four easy steps. Just follow these one by one, and the job couldn't be easier.

STEP ONE: DETECTING THE KEYS

This is obviously the first step in the process, that is, finding out that the user has pressed a function key. Given the difficulty we experienced at first just finding out whether the keys worked at all, you might expect this step to be difficult. In fact, that is just not the case; there are at least four ways we can detect that a function key has been pressed, and find out which one. Each way has its own particular advantages and disadvantages over the others. Which one you choose in each case will depend on exactly what you want to accomplish.

(i) GET A$: IF A$ = " " THEN 55Ø

The first way is probably the easiest. Just GET a character, and compare it to the graphics character that the function key produces. If they match, then branch to the appropriate sub-area of your program. One point to note–the GET command is 'destructive'; that is, if the key pressed is not the one you are testing for, it will be ignored. This can be an advantage, in that it gives the programmer more control over the flow of the program. In some cases, however, it would be a disadvantage, if you did not want to lose those other characters. A disadvantage of this method is that, if you want to test for all of the function keys, you are faced with at least eight lines of programming, and that is considered to be bad form.

(ii) GET A$: IF A$ = CHR$(133) THEN 55Ø

This method is also very simple, although it requires you to know the ASCII codes for the function keys (these are 133 to 140). Otherwise, it has the same advantages and disadvantages as the first method, with one important exception–if you want to test for all of the keys, you can do this in a FOR . . . NEXT loop in two or three lines, instead of eight.

(iii) IF PEEK (197) = 4 THEN GOTO 55Ø

This is an entirely different method of detecting the function keys. Location 197 in the VIC and the 64 is a memory register that indicates what key is currently being pressed. The operating system of your computer checks the keyboard sixty times each second, and the result of this 'scan' is stored temporarily as a code in memory location 197. Each key on the keyboard has its own unique code; the values for the

function keys are three to six on the C-64 and 39 to 63 on the VIC-20. An advantage of this method is that it is nondestructive; that is, when you PEEK at location 197, you do not destroy the computer's record of keys that have been pressed. Another interesting feature is that location 197 only holds a value while the key is being pressed, not afterward. This could be a good or a bad feature, depending on what type of program you are writing. The main disadvantage of this method is that only the four keys can be detected, not all eight.

(iv) IF PEEK (631)=133 THEN GOTO 550

As we noted, location 197 holds a code for the key pressed only temporarily. The computer remembers what has been pressed by storing a code (a different code!!) in the keyboard buffer. The buffer is a series of ten locations from 631 to 640 which holds up to the last ten keys pressed, until they are processed. The number of keys waiting to be processed is stored in location 198. The advantage of this method is that the computer will automatically keep a record of the last key or keys pressed, until you are ready to deal with them. A disadvantage is that there could be up to ten keys in the buffer, and you only get to see one at a time. This method is nondestructive, and provides access to all eight function keys.

For the purpose of building a menu, we will use the fourth method, but modify it to overcome its disadvantage. We will assume that the available choices have already been printed on the screen. Then, we will clear the keyboard buffer and wait for a key to be pressed:

```
100 POKE 198,0: WAIT 198,1
```

Remember that location 198 holds the number of keystrokes in the buffer. This line tells the computer there are none, then waits until some key is pressed. The program will not proceed to the next line until one and only one key has been pressed.

```
110A=PEEK (631)
120IF A  132 AND A  141
  THEN GOTO 9000
130 GOTO 100
```

Line 110 assigns the code for the first key pressed to variable A. The next line tests A to see if it is in the range for the function keys, that is 133 to 140. If a function key was pressed, then control of the program is transferred to a routine at line 9000. If any other key was pressed, then it is ignored and the program returns to line 100 to wait for another.

At this point we have successfully completed step one, detecting the function keys, and sent the program to line 9000 when that occurs.

STEP TWO: ACKNOWLEDGE

The function keys are different! There they are, apart from all the others, a different color, a different size. When you press them, they should do something different. They should, in some special way, acknowledge their special function. There are lots of ways to do this, of course, but a very good way is to have the keys beep when they are pressed.

For the C-64:

```
9000 POKE 54276,33
9010 FOR I=1 TO 40 : NEXT
9020POKE 54276,0
```

For the VIC-20:

```
9000POKE 36874,250
9010FOR I=1 TO 40 : NEXT
9020 POKE 36874,0
```

Before we do this, of course, we will have to set up the sound registers at the beginning of the program.

That effectively takes care of step two. There could be lots of ways to acknowledge the function keys. . . use your imagination!

STEP THREE: SORT OUT THE KEY

What we have at this stage is a number between 133 and 140 to the variable A. (If one of the other methods of detecting a key were used, then we would have a different set of values, or else an odd graphics character stored in A$.) This is not a very handy form to get the data in; what is more, the keys are not even in the right order! All of the odd function keys are numbered first, from 133 to 136, followed by the even functions from 137 to 140. What we want to do, then, is sort these values out into a more useful form. This will include putting the function keys in the right order, then assigning each one a number from one to eight, to match the descriptions on the keys. This line is a little complicated, but it achieves exactly that:

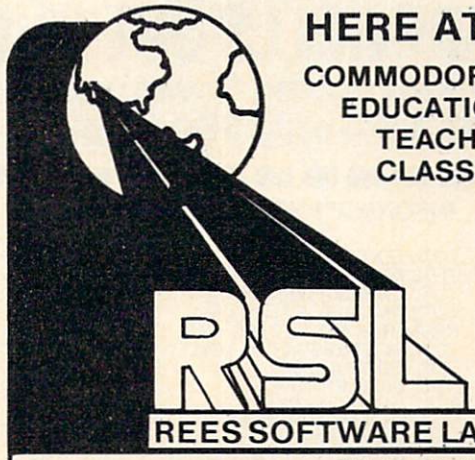
```
9030 F=2*A -265 + 7 * (A  136)
```

You might have to experiment with this line to assure youself that it works, or you can take my word for it. Multiplying A by two, then subtracting 265, yields the number series 1, 3, 5, . . . ,15. The key to this line is the last part; the expression (A 136) is a 'relational operator', and will have a value of zero for the odd-numbered functions, or –1 for the even functions. The end result is that variable F will have a value from one to eight, matching the function key that was pressed. Success!

STEP FOUR: BRANCH OUT TO SUB-AREAS

Now that we have detected a function key, acknowledged it, and sorted out

Continued on page 94



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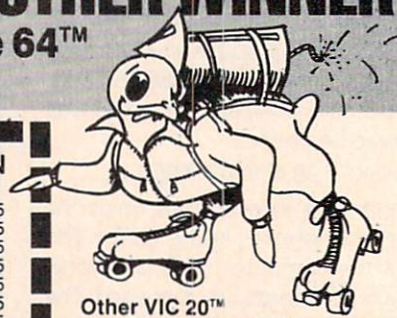

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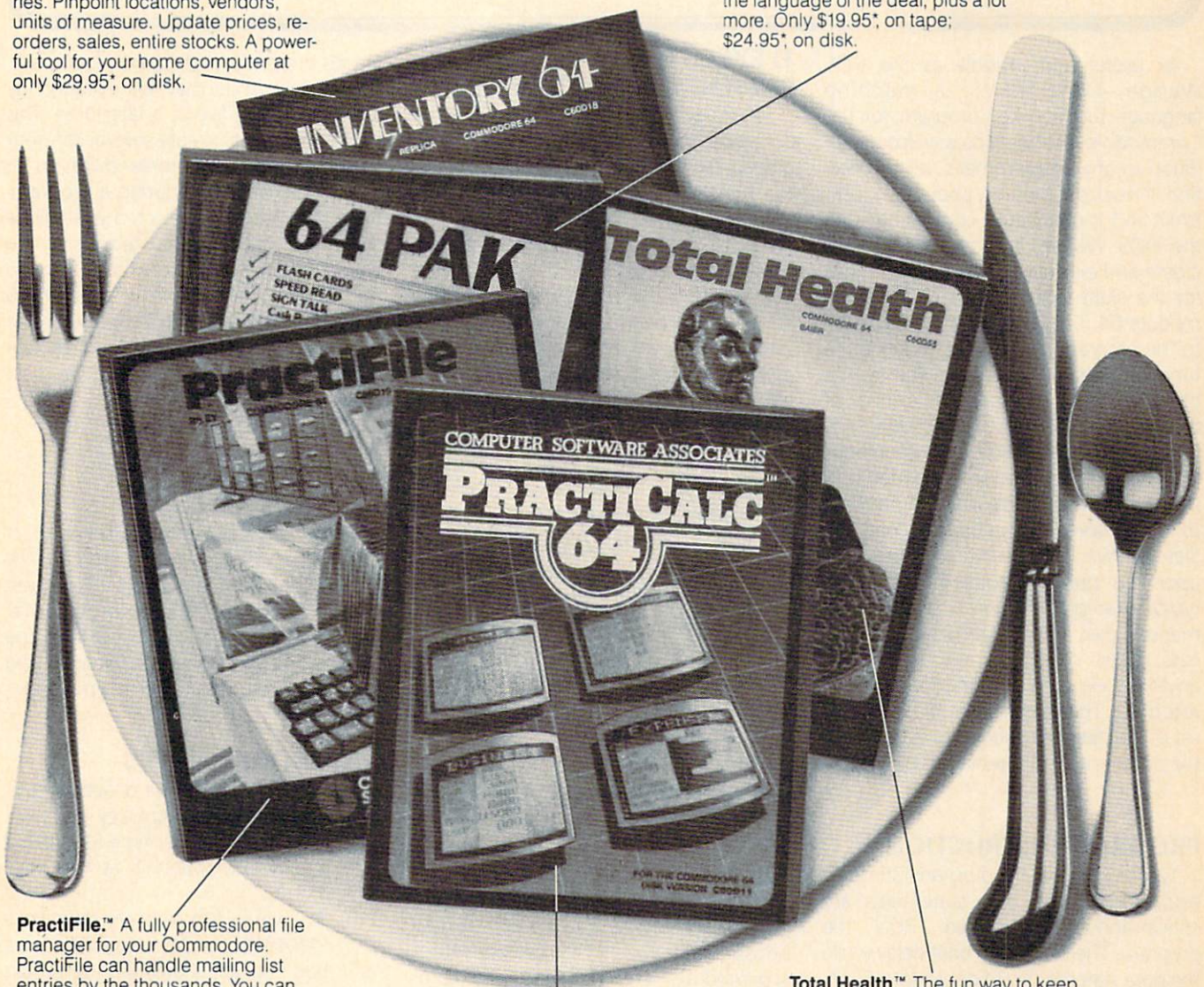

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Func*Keys

by J.L. Calvin

As useful and invisible as the DOS Wedge, FUNC*KEYS, a machine language function key program for the Commodore 64 should be a welcome addition to any programmer's utility collection. It resides in memory above basic user RAM and is completely compatible with the DOS Wedge. It allows the user to create and execute numerous definitions for the eight function keys of the Commodore 64. The user may at any time call to the program main menu, redefine the function keys, and return to the task at hand unaltered. The unique flexibility of this program lies in the fact that any previously created function key definitions may be saved to disk and reloaded at a future date. This enables the programmer to create several function key definition files and switch between them dependent upon his present requirements. Some typical examples of uses are: printer commands, disk drive commands, system calls, basic directives, and just about anything else the Commodore 64 will recognize. The program contains a default set of function key definitions as an example of the many different possible uses.

PROGRAM INSTRUCTIONS

Type in and save the program listing. Be extra careful, the data statements are critical and easily mistyped. "RUN" the program. There will be a brief delay while the data statements are poked into RAM. If you have been successful in your endeavor you will be presented with the main menu, if not, carefully recheck the data statement portion of the program for typos.

The program is menu driven and allows the user to select one of five possible options.

1. Execute present commands
2. Review present commands
3. Create new commands
4. Save present commands to disk
5. Load command file from disk

1) EXECUTE PRESENT COMMANDS

Selecting this option will assign the definitions presently residing in the program to the function keys. Once executed, the READY prompt will appear on the screen. Everything is the same as if FUNC*KEYS had not been run except that now each of the function keys will print the assigned command or text to the screen when pressed. The only time the function keys will not respond with the assigned value, is when quote mode is in effect or during a program run. In these cases, each of the function keys will respond normally.

2) REVIEW PRESENT COMMANDS

Allows the user to examine the function key definitions presently residing in the program. Each command will be listed on a separate line. After examining the commands available simply press any key to return to the main menu. Answering yes to the HARD COPY? prompt will cause a listing of the present commands to be sent to the printer.

3) CREATE NEW COMMANDS

This option allows the user to redefine each of the function keys. Once selected, a prompt indicating that the first key is being defined will appear. After the prompt, type in the command or text to be assigned to that key. If a carriage return is desired at the end of the text or command, use the back arrow key to indicate so. The return key terminates entry for the present assignment and brings the next function key prompt to the screen. Once all the function keys have been assigned a definition, the new assignments will be stored in memory and you will be returned to the main menu. A single definition should not exceed eighty characters in length and the total of all eight definitions should not exceed 490 characters.

4) SAVE PRESENT COMMANDS TO DISK

By selecting this option, the user may create a disk file containing the commands presently residing in the program. These commands may be reloaded by selecting option five at a later time. This allows the user to create several different useful function key command files to be used interchangeably during a programming session. When selected you will be presented with a prompt requesting the name under which to store this command file. Enter a file name less than 16 characters long and then press return. The commands or text will be saved on disk and you will be returned to the main menu.

5) LOAD COMMAND FILE FROM DISK

Selecting this option will allow the user to reload a previously saved command file into the program. A prompt will request the file name of the file to be loaded. Enter the file name and then press return. The previously saved file will be reloaded and you will be returned to the main menu.

ADDITIONAL NOTES

a) FUNC*KEYS will be deactivated by the run stop/restore key combination. To reactivate, type SYS 49152 and select option 1 at the main menu.

b) To change function key definitions SYS 49152, load or create new function key definitions, then select option 1.

c) A request for a hard copy of the function key definitions when no printer exists will return you to the main menu. If the printer is present but off-line the program will hang until the printer is brought on-line.

d) A disk error will cause a return of the disk error code and a return to the main menu when any key is pressed. Consult your 1541 Disk Drive manual for the exact meaning of the error code returned.

I hope you find this program to be as useful and usable as any in your present utility collection.

```
 10 REM ************************
    **
 20 REM *
      *
 30 REM *      J.L. CALVIN
      *
 40 REM *
      *
 50 REM *         FUNCKEYS
      *
 60 REM *
      *
 65 REM *          2/5/84
      *
 70 REM ************************
    ***
 80 REM
 90 REM
 95 PRINT"[clr][down, 5 times]
    [right, 8 times][rvs-on]FU
    NCKEYS[sp]INITIALIZING[rvs-
    off]"
100 FORX=49152TO50261:READA:POK
    EX,A:NEXTX
110 SYS49152
1000 DATA 120, 169, 49, 141, 20,
     3, 169, 234, 141, 21
1001 DATA 3, 88, 32, 176, 194, 1
     62, 0, 138, 141, 230
1002 DATA 195, 189, 13, 195, 201
     , 94, 240, 7, 32, 210
1003 DATA 255, 232, 76, 21, 192,
     32, 192, 194, 32, 228
1004 DATA 255, 201, 49, 240, 19,
     201, 50, 240, 18, 201
1005 DATA 51, 240, 17, 201, 52,
     240, 16, 201, 53, 240
1006 DATA 15, 76, 38, 192, 76, 2
     04, 192, 76, 58, 193
1007 DATA 76, 79, 192, 76, 24, 1
     94, 76, 30, 194, 32
1010 DATA 176, 194, 160, 0, 162,
     2, 169, 0, 145, 251
1011 DATA 200, 240, 3, 76, 88, 1
     92, 230, 252, 202, 240
1012 DATA 3, 76, 88, 192, 169, 1
     33, 141, 231, 195, 169
1013 DATA 49, 141, 232, 195, 32,
     192, 194, 162, 0, 189
1014 DATA 174, 195, 32, 210, 255
     , 232, 224, 7, 240, 3
1015 DATA 76, 119, 192, 173, 232
     , 195, 32, 210, 255, 162
1016 DATA 0, 189, 181, 195, 32,
     210, 255, 232, 224, 6
1017 DATA 240, 3, 76, 141, 192,
     173, 231, 195, 160, 0
1020 DATA 145, 251, 32, 240, 194
     , 32, 207, 194, 32, 207
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1020 DATA 145, 251, 32, 240, 194, 32, 207, 19
     4, 32, 207
1021 DATA 255, 201, 13, 240, 16, 201, 95, 208
     , 2, 169
1022 DATA 13, 160, 0, 145, 251, 32, 240, 194,
      76, 168
1023 DATA 192, 173, 232, 195, 201, 57, 240, 3
     , 76, 117
1024 DATA 192, 76, 12, 192, 120, 173, 7, 195,
      141, 20
1025 DATA 3, 173, 8, 195, 141, 21, 3, 88, 169
     , 0
1026 DATA 141, 232, 195, 32, 176, 194, 32, 51
     , 165, 76
1027 DATA 116, 164, 173, 232, 195, 208, 31, 1
     65, 215, 32
1030 DATA 249, 194, 176, 3, 76, 49, 234, 165,
      212, 208
1031 DATA 249, 160, 0, 177, 251, 197, 215, 24
     0, 6, 32
1032 DATA 240, 194, 76, 251, 192, 32, 240, 19
     4, 160, 0
1033 DATA 177, 251, 32, 249, 194, 144, 11, 16
     9, 0, 141
1034 DATA 232, 195, 32, 192, 194, 76, 49, 234
     , 201, 0
1035 DATA 240, 241, 166, 198, 157, 119, 2, 23
     0, 198, 32
1036 DATA 240, 194, 165, 198, 201, 11, 144, 2
     16, 238, 232
1037 DATA 195, 76, 49, 234, 169, 133, 141, 23
     1, 195, 169
1040 DATA 49, 141, 232, 195, 169, 0, 141, 233
     , 195, 32
1041 DATA 176, 194, 162, 0, 189, 187, 195, 20
     1, 94, 240
1042 DATA 7, 32, 210, 255, 232, 76, 78, 193,
      32, 228
1043 DATA 255, 201, 89, 240, 77, 201, 78, 208
     , 245, 32
1044 DATA 176, 194, 160, 0, 177, 251, 205, 23
     1, 195, 208
1045 DATA 55, 162, 0, 189, 174, 195, 32, 210,
      255, 232
1046 DATA 224, 6, 208, 245, 173, 232, 195, 32
     , 210, 255
1047 DATA 169, 32, 32, 210, 255, 32, 240, 194
     , 160, 0
1050 DATA 177, 251, 201, 0, 208, 3, 76, 210,
      193, 32
1051 DATA 249, 194, 176, 52, 201, 13, 208, 2,
      169, 95
1052 DATA 32, 210, 255, 76, 139, 193, 32, 240
     , 194, 76
1053 DATA 108, 193, 238, 233, 195, 169, 126,
      162, 4, 160
1054 DATA 255, 32, 186, 255, 169, 0, 32, 189,
      255, 32
1055 DATA 192, 255, 32, 125, 194, 162, 126, 3
     2, 201, 255
```

```
1056 DATA 32, 125, 194, 76, 106,
     193, 169, 13, 32, 210
1057 DATA 255, 32, 207, 194, 173
     , 232, 195, 201, 57, 208
1060 DATA 49, 173, 233, 195, 201
     , 0, 208, 26, 162, 0
1061 DATA 189, 203, 195, 201, 94
     , 240, 7, 32, 210, 255
1062 DATA 232, 76, 234, 193, 32,
     228, 255, 201, 0, 240
1063 DATA 249, 76, 12, 192, 169,
     13, 32, 210, 255, 169
1064 DATA 10, 32, 210, 255, 32,
     231, 255, 76, 12, 192
1065 DATA 32, 192, 194, 76, 106,
     193, 32, 36, 194, 76
1066 DATA 91, 194, 32, 36, 194,
     76, 108, 194, 32, 176
1067 DATA 194, 162, 0, 189, 215,
     195, 201, 94, 240, 7
1070 DATA 32, 210, 255, 232, 76,
     41, 194, 169, 125, 162
1071 DATA 8, 160, 1, 32, 186, 25
     5, 162, 0, 32, 207
1072 DATA 255, 201, 13, 240, 7,
     157, 234, 195, 232, 76
1073 DATA 66, 194, 138, 174, 11,
     195, 172, 12, 195, 32
1074 DATA 189, 255, 96, 169, 253
     , 174, 9, 195, 172, 10
1075 DATA 195, 32, 216, 255, 32,
     125, 194, 76, 12, 192
1076 DATA 169, 0, 174, 5, 195, 1
     72, 6, 195, 32, 213
1077 DATA 255, 32, 125, 194, 76,
     12, 192, 176, 11, 32
1080 DATA 183, 255, 48, 12, 173,
     230, 195, 208, 9, 96
1081 DATA 141, 230, 195, 76, 127
     , 194, 169, 5, 72, 32
1082 DATA 231, 255, 160, 0, 32,
     47, 241, 104, 9, 48
1083 DATA 32, 210, 255, 104, 104
     , 169, 13, 32, 210, 255
1084 DATA 169, 13, 32, 210, 255,
     76, 232, 193, 169, 147
1085 DATA 32, 210, 255, 169, 13,
     32, 210, 255, 169, 13
1086 DATA 32, 210, 255, 96, 173,
     5, 195, 133, 251, 133
1087 DATA 253, 173, 6, 195, 133,
     252, 133, 254, 96, 173
1090 DATA 232, 195, 41, 1, 240,
     13, 169, 4, 24, 109
1091 DATA 231, 195, 141, 231, 19
     5, 238, 232, 195, 96, 173
1092 DATA 231, 195, 56, 233, 3,
     141, 231, 195, 238, 232
1093 DATA 195, 96, 230, 251, 166
     , 251, 208, 2, 230, 252
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     201, 141, 176, 2, 56
1095 DATA 96, 24, 96, 250, 195,
     232, 192, 238, 197, 234
1096 DATA 195, 18, 49, 41, 32, 1
     46, 69, 88, 69, 67
1097 DATA 85, 84, 69, 32, 69, 88
     , 73, 83, 84, 73
1100 DATA 78, 71, 32, 67, 79, 77
     , 77, 65, 78, 68
1101 DATA 83, 13, 13, 18, 50, 41
     , 32, 146, 82, 69
1102 DATA 86, 73, 69, 87, 32, 69
     , 88, 73, 83, 84
1103 DATA 73, 78, 71, 32, 67, 79
     , 77, 77, 65, 78
1104 DATA 68, 83, 13, 13, 18, 51
     , 41, 32, 146, 67
1105 DATA 82, 69, 65, 84, 69, 32
     , 78, 69, 87, 32
1106 DATA 67, 79, 77, 77, 65, 78
     , 68, 83, 13, 13
1107 DATA 18, 52, 41, 32, 146, 8
     3, 65, 86, 69, 32
1110 DATA 69, 88, 73, 83, 84, 73
     , 78, 71, 32, 67
1111 DATA 79, 77, 77, 65, 78, 68
     , 83, 32, 84, 79
1112 DATA 32, 68, 73, 83, 75, 13
     , 13, 18, 53, 41
1113 DATA 32, 146, 76, 79, 65, 6
     8, 32, 67, 79, 77
1114 DATA 77, 65, 78, 68, 32, 70
     , 73, 76, 69, 32
1115 DATA 70, 82, 79, 77, 32, 68
     , 73, 83, 75, 13
1116 DATA 13, 94, 13, 70, 75, 69
     , 89, 32, 18, 146
1117 DATA 32, 61, 32, 63, 32, 72
     , 65, 82, 68, 32
1120 DATA 67, 79, 80, 89, 32, 89
     , 47, 78, 32, 63
1121 DATA 94, 13, 13, 18, 65, 78
     , 89, 32, 75, 69
1122 DATA 89, 146, 94, 70, 73, 7
     6, 69, 32, 78, 65
1123 DATA 77, 69, 32, 61, 32, 63
     , 32, 94, 0, 137
1124 DATA 0, 0, 56, 229, 52, 168
     , 200, 165, 52, 240
1125 DATA 17, 141, 68, 198, 166,
     51, 189, 0, 133, 79
1126 DATA 80, 69, 78, 52, 44, 52
     , 58, 67, 77, 68
1127 DATA 52, 58, 76, 73, 83, 84
     , 13, 137, 80, 82
1130 DATA 73, 78, 84, 35, 52, 58
     , 67, 76, 79, 83
1131 DATA 69, 52, 13, 134, 76, 7
     9, 65, 68, 34, 36
```

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BASIC + ML = ?

by Glen E. Colbert

One thing that prevents many people from moving from BASIC into the realm of machine language is a fear of the inability to write an entire program in code. However, programs don't have to be all machine language or all BASIC or all anything. In fact, I believe that the best program is one that is a combination of the user's language and the machine's. Everyone has had a program that just didn't quite do what they wanted it to, or didn't operate well with their equipment. On occasions when the program is in BASIC, "customizing" it is (usually) quite easy. On the other hand, tailoring a machine language program can be nothing less than a nightmare, but there are times when machine language is unavoidable. Sorting string arrays provides a prime example of this.

One of the (small) problems that has to be taken care of to "hybridize" a program is finding room in your computer for the machine language and BASIC programs to live and work. There are several ways to accomplish this. One way is to "steal" some of BASIC's work area and reserve it for the machine language program. Similar to this is the technique of putting the code inside the BASIC text area of memory. Another method is to use an area of memory which BASIC does not utilize (e.g. the cassette buffer). A fourth method is "chaining" the programs. Chaining is a process in which one program "LOADs" a separate program to perform a specific job. Once the job is performed, the second program then reloads the main program and execution continues.

MERGING THE PROGRAMS

Let's look at different ways to combine BASIC text and machine code. To do this, a machine language sort routine is provided which will be merged into a basic program in several different ways. The routine is relocatable (will run at any available memory location), and was written to run on either the 64 or on a VIC-20 with one small modification (line 505 in listing #1). By POKEing a value into memory location 828, the sort can be made from inside the string. For example, if the first five characters of the string are a zip code and the last name starts at the sixth position, the routine would sort by zip if a zero were POKEd into location 828. However, POKEing a five into 828 would result in the routine sorting by names. It will sort 100 elements in an array in about two seconds. It is one which you will want to keep around as a permanent addition to your subroutine library.

The data for each of the examples is provided in program listing #1. I recommend that you type it in and save it as an independent file. Then the other programs can be easily merged with it.

BASIC LOADERS

Listing #2 gives an example of the most common method of merging ML and BASIC. Often called a "BASIC loader," this program READs the values from DATA statements and POKEs the machine language into memory. In this example, the routine is written into the top of the BASIC string storage area. To protect the program from BASIC attempting to store strings on top of it, line 105 changes the pointers to the top of memory. This leads BASIC to believe that the memory ends before the machine language routine, preventing it from storing information there. The variable ML is set by computing the top of BASIC address from the pointer as 55-56. ML is then used for both determining where to start POKEing the code and knowing where to SYS to for the sort.

Basic loaders are popular for several reasons. Probably the most often given reason for their use is that very little programming expertise is required to use them. They are also quite easy for a user to modify for a particular application (so long as the code is relocatable). They don't require a machine language monitor or assembler, and it is easy to check for typing errors with a check sum (see CK in lines 125-135).

There are, however, two drawbacks to this method. First, it requires quite a bit more memory. In the given example, the machine language takes up 264 bytes of memory. However, the overhead for the poke routine and the BASIC data for the poke take up around 900 more bytes! That means that over 1K of memory is lost for just one small routine. While 1K may not seem like much, it really is, particularly if the program is to run on a 5K VIC.

The second problem, while much less serious, can be quite annoying with long machine language routines. This is the time that the program seems to "stop" while the machine language is POKEd into memory. If this method is employed, it is a good idea to flash a message on and off while it is being stored to avoid "blank screen paranoia".

INSIDE BASIC TEXT

A more memory efficient method would be to save the machine language in its object (executable) form directly with the BASIC program. Then, each time the program is loaded, the machine language is ready to go. For Disk users, merging the files is quite simple. The machine language can be saved to the disk as a program file and appended to the BASIC program with the "C0:" command in the Disk Operating System (DOS). Once the files have been

appended this way, the machine language is a part of the main program file on the disk. Each time it is loaded, the machine language is too. BASIC starts storing variables AFTER the last location loaded. This automatically takes care of the problem of protecting the routine from BASIC.

One problem with this method is determining where the machine language routine starts after the programs have been merged. However, because the pointer to the start of BASIC variables points to an address *three bytes past* the end of the routine, it can be used to find the correct address to SYS to. Just subtract the length of the machine language routine + 3 from the address given by the start of variables pointer! Now the machine language is much less of a memory hog. Program three gives an example of writing a program file from data statements.

Running this program will write a program file called "ml.program" to the disk. Once this has been done, type in program number four. This program should then be SAVEd to the same disk using the name "BASICPROGRAM." To merge the files, send the following commands to the disk drive:

```
500 DATA 32,115,0,32,139
505 DATA 176:REM 208 FOR VIC 20
510 DATA 165,47,133,252
515 DATA 165,48,133,253,160,0,177,252,197,69
520 DATA 208,7,200,177,252,197,70,240,31,160
525 DATA 2,24,177,252,101,252,72,200,177,252
530 DATA 101,253,133,253,104,133,252,165,253
    ,197
535 DATA 50,144,217,165,252,197,49,144,211,9
    6
540 DATA 160,5,177,252,141,160,3,200,177,252
545 DATA 141,161,3,169,1,141,162,3,169,0
550 DATA 141,163,3,24,165,252,105,7,133,228
555 DATA 165,253,105,0,133,229,165,228,133,2
    18
560 DATA 165,229,133,219,24,165,218,105,3,13
    3
565 DATA 228,165,219,105,0,133,229,160,0,177
570 DATA 218,208,51,24,173,162,3,105,1,141
575 DATA 162,3,173,163,3,105,0,141,163,3
580 DATA 173,163,3,205,160,3,144,204,173,162
585 DATA 3,205,161,3,144,196,173,164,3,208
590 DATA 6,169,147,32,210,255,96,169,0,141
595 DATA 164,3,240,155,141,165,3,177,228,240
600 DATA 231,141,166,3,200,177,218,133,226,1
    77
605 DATA 228,133,230,200,177,218,133,227,177
    ,228
```


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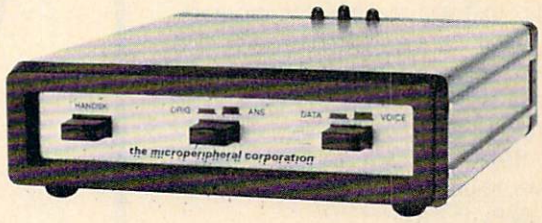

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```
610 DATA 133,231,172,60,3,177,226,209,230,14
    4
615 DATA 168,240,2,176,11,200,204,165,3,240
620 DATA 158,204,166,3,208,235,160,0,173,166
625 DATA 3,145,218,173,165,3,145,228,200,165
630 DATA 230,145,218,165,226,145,228,200,165
    ,231
635 DATA 145,218,165,227,145,228,169,1,141,1
    64
640 DATA 3,169,0,240,210
```

```
OPEN15,8,15
PRINT#15,"CO:BOTH=BASIC
PROGRAM,ML.PROGRAM
CLOSE15
```

The "CO:" command will create a new file on the disk called "BOTH." It contains the BASIC program from listing 4 and the machine language program created by listing 3. The result is a user modifiable BASIC program with a *fast* machine language sort routine that only uses 260 bytes of memory.

The files could be appended on the disk by changing line #30 in listing three to read OPEN3,8,3"BASICPROGRAM,A" to directly append the file, but having separate files makes corrections and changes much easier later on. Aside from the significant memory savings that this method provides, it has an additional advantage. It seems that when BASIC text is moved around to make room for new lines (or deleted lines) and when a program is saved, the start of variables pointer is used to determine when enough text has been moved. This means that the machine language is not overwritten when changes are made to the BASIC program. It also means that your machine language will be saved along with any changes that you make to the program. With this pointer being used to determine the starting address of the machine code, the address to +SYS doesn't have to be re-computed each time changes are made to the BASIC program. This only applies however, to programs that do not have internal JMPs or JSRs.

GETTING THE BOOT

There are times when the routine that is to be used with the BASIC program is not relocatable. How about that routine in last month's magazine that *has* to be located at $C000, but with the BASIC loader and your program both in you keep running out of memory? If you are comfortable with machine language, there is always the option of modifying the code to run at the end of BASIC as in the last example. However, every time the BASIC text is edited, the code will have to be re-modified. There is a solution which, while not too graceful, does take care of this problem. This is to load the program with the machine language data, POKE the code, protect it, and then load the main program. A problem which is often encountered in using this method is that when one BASIC program LOADs another, the start of variable pointers are not reset to the end of the new program. While this permits passing variables between the two programs, it also means that the second program loaded must be smaller than the first. If this condition is not met, the variables will be stored in the same memory area that the BASIC text is. This will almost guarantee the program to crash.

One way of working around this problem is to use the 'dynamic keyboard technique,' using the keyboard que to force load the second program. Listing #5 provides an example of this method. This program is loaded first. It POKEs the machine language into an area which is not used by BASIC. In this example, it puts

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the code into the block of memory above BASIC at $C000. At line thirty, the screen is cleared and the LOAD and RUN commands are printed on the screen just as if they had been typed in.

You may have noticed that, at times, a BASIC program will seem to stop for a few seconds then continue. If keys have been pressed while this happened the characters may seem to suddenly appear once the program resumes. Even while BASIC is busy, the computer is looking at the keyboard to see if a key is being pressed. If a key has been pressed, the computer wil put it in a temporary area of memory for BASIC to use when it 'gets the time.' This area of memory is called the "keyboard que" and is located from address 631-640. Additionally, the computer stores the number of characters in the buffer in address 198 so that BASIC knows when to stop reading information from the que. Line 50 POKEs a four into address 198 to "fool" BASIC into thinking that there are four characters waiting for it. Line 60 POKEs four carriage returns into the keyboard que. When the program reaches the END in line 70, the program stops, but BASIC still thinks that is has characters to process. The LOAD and RUN messages were printed on the screen to be on the lines where the cursor will end up as the program stops. When BASIC processes the carriage returns, it is as if someone had typed in the load instruction and pressed return. By changing the character color to the background color, the process will be invisible to the user.

A better method might be to have the first program change the start of variables pointer to where it would be for the second program by poking new values into memory locations 44-45. The second program can then be loaded by a LOAD"PROGRAM",8 within the first program.

CHAINING PROGRAMS

The boot method illustrated the fact that one program can load and run another. With a little bit of deduction, it should become clear that the machine language program doesn't really have to be in the computer at the same time as the BASIC program. Rather, it can be kept out on the disk as a separate program and loaded in when needed. This eliminates the need for protecting an area in memory for the program. Not only does it save the 900+ byte basic loader overhead found in listing #2, it also eliminates the 260 bytes taken up by the machine language itself. By chaining, programs can be run on an unexpanded VIC that would require a much larger computer if all of the segments were loaded together.

When one program LOADs another, the second program loaded begins execution at the first line. To avoid re-initializing variables and REDIMMED ARRAY errors, some method must be employed to jump into the program at a safe point after it is loaded. One way of doing this is to check for a variable that is known to have a value after the first program has been run. If the value is set, then the program should GOTO the safe entry point. Otherwise, it should be alright to execute the program normally. For an example of this, see line 5 in the disk librarian program.

The program given in listing #3 shows that a machine language program can be written out to the disk as a program file. However, if the program created by it is loaded into memory as a BASIC program, LISTing it will show garbage. Typing RUN

```
10 GOTO100
20 **********************
21 *      LISTING #2      *
22 *  BASIC LOADER FOR    *
23 *       STRING         *
24 * ARRAY SORT ROUTINE   *
25 *    W/SAMPLE USAGE    *
26 **********************
30 DIM S$(100):REM CREATE ARRAY
35 PRINT""[clr][down, 5 times]CREATING[sp]S
   TRING[sp]ARRAY""
40 FORL=1TO100
45 FORJ=1TO30
50 S$(L)=S$(L)+CHR$((RND(1)*26)+65)
55 NEXTJ:PRINTS$(L):NEXTL
60 POKE 828,0 :REM STRING POSITION TO SORT
   FROM
65 PRINT""[down, 2 times]STARTING[sp]SORT""
   :TI$=""000000""
70 SYS(ML),S$(0):T=TI
75 PRINT""SORT[sp]FINISHED""
80 FORL=1TO100
85 PRINTS$(L)
90 NEXTL
95 PRINTSORT TIME =""T/60"" SECONDS"":END
100 REM BASIC LOADER
105 POKE56,PEEK(56)-2:CLR
110 ML=PEEK(55)+256*PEEK(56):REM NEW TOP OF
   MEMORY
115 FORL=MLTOML+264
120 READ DT:POKEL,DT
125 CK=CK+DT
130 NEXTL
135 IFCK<>38208 THEN PRINT ""ERROR[sp]IN[sp]
   DATA"":END:REM CK<>38240 ON VIC
140 GOTO30
```


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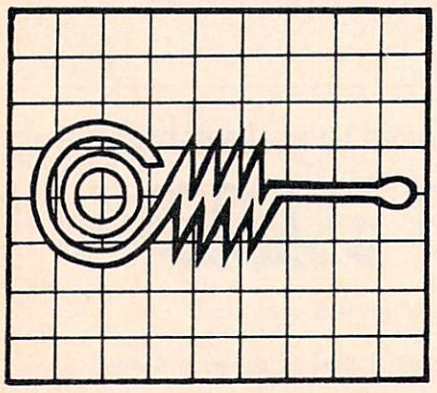
will result in a SYNTAX ERROR. How then, can a machine language program be loaded from a BASIC program with the LOAD command and be executed? Listing #7 is a program which writes another program. Type it in with the data statements in listing #1 and RUN it. It will write a program file called "CHAIN SORT" to the disk. Load "CHAIN SORT" and LIST it. The BASIC lines displayed were written from the data in lines 300 to 335.

Chain Sort is a simple program. All it does is call a machine language routine, then load the main program. However, unlike the programs written by program number 3, it can be loaded and run independently.

DISK LIBRARIAN

Program #6 is a rather handy program. It provides alphabetized listings of files on one or more disks. The DIM statements should be changed to reflect the number of programs and disks that need to be cataloged for your particular purpose. Also, the printer routines may need to be changed to operate properly on your equipment. While it is a nice utility to have, it was written to give you an opportunity to experiment with these different methods of merging BASIC and machine language. There is nothing like a few successful experiments to build confidence.

Each method has advantages and disadvantages. Each is more appropriate in some situations than in others. How often does the routine have to be called? How tight are the memory restrictions? How difficult will modifications to the program be? How idiot proof does the program have to be? Only you can answer these questions about your own programs, but a bit of playing around with these techniques will help when it comes time to merge your own routines.



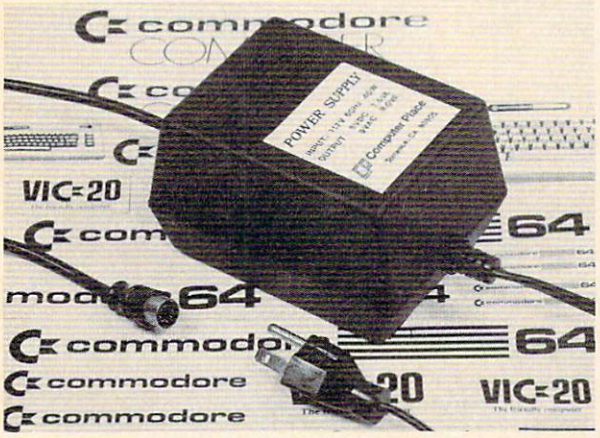
```
 10 GOTO30
 20 ******************************
 21 *    PROGRAM TO WRITE A      *
 22 *      PROGRAM FILE TO       *
 23 *    THE DISK FROM DATA      *
 24 *  IN BASIC DATA STATEMENTS  *
 25 ******************************
 30 OPEN 3,8,3,''ML.PROGRAM,P,W''
 35 PRINT#3,CHR$(1);:REM LOW BYTE OF START A
    DDRESS
 40 PRINT#3,CHR$(8);:REM HIGH BYTE OF START
    ADDRESS
 45 FORL=1TO265
 50 READ DA:PRINT#3,CHR$(DA);
 55 NEXT:PRINT#3,CHR$(0);CHR$(0);
 60 CLOSE3:END
135 IFCK<>38208THENPRINT''ERROR[sp]IN[sp]DAT
    A'':END:REM CK<>38240 ON VIC
500 DATA FROM LISTING #1 HERE
```

```
 10 GOTO30
 20 ************************
 21 *      LISTING #4      *
 22 *  THIS PROGRAM IS TO  *
 23 *    BE MERGED WITH    *
 24 * ML.PROGRAM WHICH WAS *
 25 * CREATED BY LISTING 3 *
 26 ************************
 30 ML=PEEK(45)+256+PEEK(46)-264-3
 35 DIM G$(100):PRINT''CREATING[sp]ARRAY''
 40 FOR L=1TO100
 45 FOR J=1TO15
 50 G$(L)=G$(L)+CHR$((RND(1)*26)+65)
 55 NEXTJ:PRINTG$(L):NEXTL
 60 PRINT''STARTING[sp]SORT'':TI$=''000000''
 65 SYS(ML),G$(0):T=TI
 70 PRINT''SORT[sp]FINISHED''
 75 FORL=1TO100
 80 PRINTG$(L)
 85 NEXTL
 90 PRINT''SORT[sp]TIME[sp]=''T/60''[sp]SECO
    NDS''
 95 END
```

```
 10 GOTO100
 20 **********************
 21 *      LISTING #5      *
 22 *  BOOT LOADER FOR     *
 23 *     DISK LIBRARY     *
 24 *       C-64 ONLY      *
 26 **********************
 30 PRINT''[clr][down, 2 times]
    LOAD''CHR$(34)''MAIN[sp]PR
    OGRAM''CHR$(34)'',8''
 40 PRINT''[down, 4 times]RUN[h
    ome]'';
 50 POKE198,4:REM NUMBER OF CHA
    RACTERS IN BUFFER
 60 FORL=631 TO 635:POKEL,13:NE
    XT:REM FILL BUFFER WITH <CR
    >S
 70 END
100 REM BASIC LOADER
110 ML=49152
115 FORL=MLTOML+264
120 READ DT:POKEL,DT
125 CK=CK+DT
130 NEXTL
135 IFCK<>38208 THEN PRINT ''ER
    ROR[sp]IN[sp]DATA'':END
140 GOTO30
500 REM DATA FROM LISTING ONE H
    ERE
```

```
  5 IFCO<>OTHEN60
 10 DIMAS$(500),DI$(29):CO=1:OP
    EN15,8,15
 20 PRINT''[clr][down, 5 times]
    [sp, 12 times]DISK[sp]LIBR
    ARIAN''
 30 PRINT''[down][sp, 12 times]
    BY[sp]G.E.COLBERT''
 40 PRINT''[down, 5 times][sp,
    2 times]PRESS[sp][rvs-on]RE
    TURN[rvs-off][sp]TO[sp]BEGI
    N''
 50 GETW$:IFW$<>CHR$(13)THEN50
 60 PRINT''[clr][down]DISKS[sp]
    ENTERED[sp]SO[sp]FAR:''
 70 FORL=1TODI
 80 PRINTDI$(L):NEXT
 90 PRINT''[down][sp, 6 times][
    rvs-on]A[rvs-off]DD[sp]DISK
    [sp, 2 times][rvs-on]P[rvs-
    off]RINT[sp][rvs-on]S[rvs-o
    ff]ORT''
100 GETW$:IFW$=''''THEN100
110 IFW$=''P''THEN1000
115 IFW$=''S''THEN2000
120 IFW$<>''A''THEN100
130 PRINT''[down]INSERT[sp]DISK
    [sp]TO[sp]BE[sp]ENTERED[sp]
    INTO[sp]THE''
```


Better Than Original Equipment



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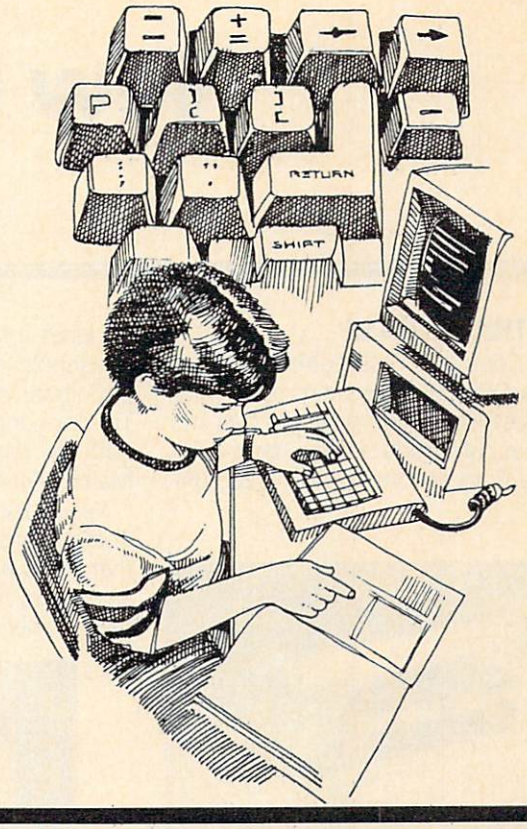
Circle No. 27

```
140 PRINT''CATALOG,[sp]THEN[sp]
    PRESS[sp][rvs-on]RETURN[rv
    s-off]'''
145 GETW$:IFW$<>CHR$(13)THEN145
150 PRINT#15,''I0:''
160 INPUT#15,E,E$,E1,E2
170 IFE<>0THENPRINTE;E$;E1;E2:G
    OTO90
190 GOSUB500:GOTO60
500 FL=1
510 CLOSE1:OPEN1,8,0,''$0''
520 GET#1,A$,B$
530 GET#1,A$,B$
540 GET#1,A$,B$
550 C=0
560 IFA$<>''''THENC=ASC(A$)
570 IFB$<>''''THENC=C+ASC(B$)*2
    56
580 AS$(CO)=RIGHT$(''[sp, 4 tim
    es]''+MID$(STR$(C),2),3)+''
    [sp]''
590 GET#1,B$:IFST<>0THEN700
600 IFB$<>CHR$(34)THEN590
610 GET#1,B$:IFB$<>CHR$(34)THEN
    AS$(CO)=AS$(CO)+B$:GOTO610
620 GET#1,B$:IFB$=CHR$(32)THEN6
    20
630 C$=''''
640 C$=C$+B$:GET#1,B$:IFB$<>''''
    THEN640
650 AS$(CO)=LEFT$(AS$(CO)+''[sp
    , 20 times]'',20)
660 AS$(CO)=AS$(CO)+LEFT$(C$,3)
670 IFFL=1THENFL=2:DI=DI+1:DI$(
    DI)=AS$(CO):CO=CO-1:GOTO690
680 AS$(CO)=AS$(CO)+''[sp, 2 ti
    mes]-[sp, 2 times]''+RIGHT$
    (DI$(DI),3)
685 PRINTAS$(CO)
690 CO=CO+1:IFST=0THEN530
700 AS$(CO)='''':CO=CO-1
710 CLOSE1
730 RETURN
1000 REM*****  PRINT CATALOG  **
     ******
1010 OPEN4,4:P=1
1020 PRINT''POSITION[sp]PAPER[sp
     ]TO[sp]TOP[sp]OF[sp]FORM''
1030 PRINT''THEN[sp]PRESS[sp][rv
     s-on]RETURN[rvs-off]''
1040 GETW$:IFW$<>CHR$(13)THEN104
     0
1050 FORL=1TOCOSTEP60
1060 PRINT#4,CHR$(14)''DISK[sp]C
     ATALOG[sp, 3 times]PAGE[sp,
      2 times]#'';P
1070 PRINT#4,''[sp]#[sp, 5 times
     ]FILE[sp]NAME[sp, 6 times]T
     YPE[sp, 4 times]DISK''
1080 PRINT#4,''BLKS[sp, 27 times
     ]ID[sp]''
1090 FORJ=0TO59
1100 PRINT#4,''[sp, 13 times]''A
     S$(L+J):NEXTJ
1120 PRINT#4,CHR$(14)''[sp, 4 ti
     mes]PAGE[sp]#'';P:P=P+1
1130 PRINT#4,CHR$(10)
1150 NEXTL
1160 PRINT#4,''FINISHED''CHR$(10
     ):CLOSE4
1170 GOTO60
2000 REM *****  SORT ROUTINE  **
     ***
2010 PRINT''SORT[sp]BY[sp][rvs-o
     n]S[rvs-off]IZE[sp][rvs-on]
     N[rvs-off]AME[sp][rvs-on]T
     [rvs-off]YPE[sp][rvs-on]D[r
     vs-off]ISK[sp]ID''
2020 INPUTW$:IFW$=''S''THENP=0:G
     OTO2070
2030 IFW$=''N''THENP=4:GOTO2070
2040 IFW$=''T''THENP=20:GOTO2070
2050 IFW$=''D''THENP=24:GOTO2070
2060 GOTO2010
2070 POKE828,P
2080 REM *****  CALL SORT ROUTIN
     E *****
2090 LOAD''CHAIN[sp]SORT'',8
2100 PRINT''LOAD[sp]PROGRAM[sp]D
     ISK'':GOTO2010
```

```
 10 GOTO30
 20 ****************************
    ****
 21 *     THIS LISTING CREATES
     *
 22 * A PROGRAM FOR CHAINING WI
    TH *
 23 *     A SECOND PROGRAM TO
     *
 24 *  SORT A STRING ARRAY AS$(
    X)  *
 25 ****************************
    ****
 30 OPEN 3,8,3,''CHAIN[sp]SORT,
    P,W''
 35 PRINT#3,CHR$(1);:REM LOW BY
    TE OF START ADDRESS
 40 PRINT#3,CHR$(8);:REM HIGH B
    YTE. USE 16 WITH VIC 18 W/E
    XPANDED VIC
 45 FORL=1TO265+78:REM ROUTINE
    + BASIC
 50 READ DA:CK=CK+DA:PRINT#3,CH
    R$(DA);
 55 NEXT:PRINT#3,CHR$(0);CHR$(0
    );
```

```
 60 CLOSE3
135 IFCK<>42443THENPRINT''ERROR
    [sp]IN[sp]DATA'':REM CK<>42
    480 ON VIC (42488 EXP. VIC)
140 END
288 REM ** BASIC PROGRAM SEGMEN
    T **
300 DATA 17,8,10,0,158,40
301 DATA 50:REM 52 VIC 52 EXP.
    VIC
302 DATA 49:REM 49 VIC 54 EXP.
    VIC
303 DATA 50:REM 55 VIC 56 EXP.
    VIC
304 DATA 55:REM 53 VIC 55 EXP.
    VIC
305 DATA 41,44,65,83,36,0,39,8,
    20,0
310 DATA 147,34,77,65,73,78,32,
    80,82,79
315 DATA 71,82,65,77,34,44,56,0
    ,71,8
320 DATA 30,0,153,34,73,78,83,6
    9,82,84
325 DATA 32,77,65,73,78,32,80,8
    2,79,71
330 DATA 82,65,77,32,68,73,83,7
    5,34,0
335 DATA 77,8,40,0,138,0,0,0
400 REM ****** SORT ROUTINE ***
    ****
```



REMs to Readers

Submitting Material to *COMMANDER* Magazine

We encourage everyone to submit articles/programs to *COMMANDER* for possible publication. If you have written an original program/article about a computer application, product, or educational approach, please send us a manuscript or letter of inquiry. Materials of interest to beginning, intermediate, and advanced programmers are welcomed.

Submitted materials should follow these guidelines:

1. Articles must be typed double-spaced, in upper and lower case on 8½″ x 11″ paper, with at least 1½″ margins on all sides. Good quality printers may be used if the output is clear and dark. Two copies of each article should be included.
2. Programs must be provided in both hard-copy listing and machine readable form (disk or tape). Where feasible, please include both C-64 and VIC-20 versions.
3. Each page should include your name, title of the article, the date submitted, and the page number. Any accompanying listings, photos, graphs, etc., must be clearly identified.
4. In your cover letter, include a brief description of your relevant background and interests, the computer equipment you use, and the intended audience of your submission. Don't forget your address with day and evening phone numbers.
5. We only consider articles that are submitted exclusively to *COMMANDER*. If you do not receive a response from our office within eight weeks, please write or call before sending it to another publication.
6. The amount of payment for accepted materials depends on the type, length, and quality. You will receive an author contract specifying payment and copyright details before publication.
7. Reviews of commercial products are generally commissioned from our office. Please, do not solicit free copies from manufacturers on your own. However, we would consider well-written, timely reviews of hardware and software you have purchased for your own use.

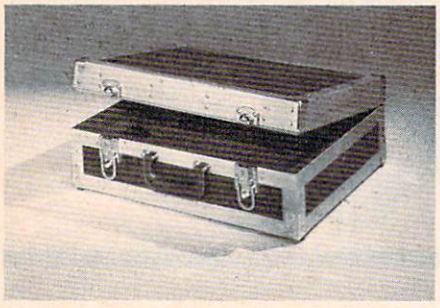
Materials not accepted for publication can be returned only if a SASE or adequate postage is included. Please send all unsolicited materials to:

Submissions Editor
COMMANDER Magazine
P.O. Box 98827
Tacoma, WA 98498

New Products

THE TRAV-L-CASE

The Computer Case Company of Columbus, Ohio, producers of compact carrying cases for microcomputers for over four years has just introduced new Trav-L-Cases for the Commodore 64 or Vic 20 computer



These cases are constructed of heavy duty materials with extensive inside foam padding to provide the level of protection required for the frequent long distance traveler. They are constructed of plywood sides covered with scuff resistant vinyl on the outside for an attractive appearance, metal protection on the edges and corners, key draw bolt locks, padded handle and a minimum of one inch of foam padding on all sides for protection of the equipment.

The cases have been sized to hold the equipment in a package that can be handled by one person and will easily fit inside the trunks of most standard size cars.

The cases can be obtained through most computer stores or direct from the Computer Case Company, 5650 Indian Mound Court, Columbus, Ohio 43213, (614) 868-9464 or (800) 848-7548.

KEEPTRACK™

FILE MANAGER FOR PERSONAL COMPUTERS

Turn your Commodore 64 or VIC 20 into an electronic organizer! *KeepTrack: File Manager for Personal Computers* by Norm Church is a versatile program that allows your computer to "keep track" of all kinds of information: mailing lists, household inventories, tax expenses, bibliography lists, birthdays, recipes, etc. The book and book/software package will both be released by Dilithium Press in March, 1984.

KeepTrack: File Manager for Personal Computers is a file management program that stores and retrieves information like an ordinary file cabinet—except it's much faster, easier to use, and more flexible.

KeepTrack: File Manager for Personal Computers performs all of the following useful functions: add data, display data, change data, save a file, retrieve a file, print labels, sort by category, turn sort off, and select categories. The software contains the *KeepTrack* program as well as two data files.

Dilitium Press
8285 SW Nimbus Suite 151
Beaverton, OR 97005

SOFTWARE LETS NOVICES AND PROS SEE THEIR MUSICAL COMPOSITIONS IN STANDARD NOTATION ON COMMODORE 64

A software package which shows MusiCalc 1 users how their improvisations and creations would look in standard musical notation.

According to Waveform, users can see the notation on any screen used with the Commodore 64, and also obtain easy-to-read printouts using any of several graphics printers.

The product, called MusiCalc 2 ScoreWriter, translates score sequences created on MusiCalc 1 into standard music notation that appears on the screen in either one, two or three voices at a time, depending on the user's preference. ScoreWriter lets users link MusiCalc 1 sequences together, allowing compositions to contain over 7,000 notes.

Users can receive easy-to-read printouts of their creations by installing a compatible Epson printer with the Graftrax option, or a Commodore VIC-1525 graphics printer.

MusiCalc 2 ScoreWriter works in conjunction with MusiCalc 1.

The ScoreWriter package also includes SyncLink, which McCreery described as "a bonus program which allows the MusiCalc system to work in sync with up to eight digital effects devices, including popular drum machines such as Drumulator, Drumatix and Dr. Rhythm. With SyncLink, you can have the digital effects device control the MusiCalc system and vice versa.

"ScoreWriter makes it possible for anyone to create written music," said McCreery. "And musicians who can't read or write in standard musical notation can use the MusiCalc 2 Scorewriter to translate improvisations into sheet music. Musicians can also use MusiCalc 2 ScoreWriter for copywriting and publishing purposes, or for supplying band members with copies of arrangements."

Waveforms MusiCalc 2 ScoreWriter retails for $34.95, and will be available

through computer specialty stores, computer software stores, book stores and musical instrument stores.

SYNAPSE ANNOUNCES RELAX: THE FIRST IN A SERIES OF PERSONAL HEALTHWARE PROGRAMS FOR HOME COMPUTERS

Synapse has announced the debut of their new hardware/software package RELAX, a stress reduction system designed for use with your home computer.

Using bio sensory technology, RELAX allows you to monitor stress levels by representing muscle tension graphically on your computer monitor. The RELAX

workbook that is included with the hardware and software helps you to understand your reactions to stress and also provides suggestions for managing and reversing those reactions. An audio tape guides you into deep relaxation, and when you use this tape in conjunction with the biofeedback mechanism, you'll be able to see and feel results. RELAX also allows you to program in subliminal messages that will reinforce your relaxation response.

The method is simple. Put on your RELAX sensor headband. Three tiny sensors in the band provide highly accurate measurements of muscle tension. This biofeedback method, called electromyograph (or EMG), measures electrical activity in the muscles. When you're tense, electrical activity increases. Of course, when you are relaxed, electrical activity decreases and your muscles lose their tension. With RELAX, this is portrayed graphically on your computer monitor.

A control unit allows you to determine the sampling rate that you wish to use. A very fast sample can help you discover your unconscious reactions to stressful stimuli, and a slower averaged rate will give you a general index of relaxation. Whatever setting you choose, you can see the readings immediately on the screen. If you attach a printer to your computer, your reading can also be printed out.

RELAX is the first in a series of products from the new personal healthware division of Synapse, designed to use the capabilities of your home computer to help monitor and improve your health.

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STATISTICS PACKAGE FOR COMMODORE 64

Quality Input, Inc., has just announced the release of "Q-STAT," a statistical package designed for the Commodore 64. The Q-STAT package was designed for the researchers in education, social sciences, natural sciences, and business. The extensive documentation and the simplicity of this package make using Q-STAT an easy, enjoyable experience. Completely menu-driven, Q-STAT allows you to perform complex statistical procedures by simply pressing a key. Statistical results may be sent to the printer as well as to the screen. Data Management, Data Transformation, Descriptive Statistics, Cross-tabulation, T-tests, Non-parametric statistics, Correlation Analysis including Scattergrams, Residual Analysis, ANOVA and Time-Series Analysis are just a few of the functions Q-STAT is capable of performing. Also included is a "Memo Pad" which allows the user to send text to the printer, eliminating the need to load a word processor. Q-STAT is available on diskette for $269.95. For further information, call or write Quality Input, Inc., 309 W. Beaufort, Normal, Illinois, 61611, (309) 454-1061.

DESKMATE PUTS YOUR COMPUTER IN ITS PLACE

HollisCraft of Hollis, NH announces the introduction of the DeskMate, a ready-to-finish, desk-top organizer for personal computers. The DeskMate holds all popular brands of computers, turning any desk or table into a convenient computer work station.

The DeskMate features a turntable shelf for the CRT which rotates a full 360° on ball bearings. Next to this shelf there is

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★★★★★★★★★★★

space for a printer. Underneath, a shelf holds fan-fold paper which feeds through a convenient slot to the printer above. This shelf is handy for storing software and peripherals, too. The DeskMate fits on any flat surface making a convenient cover for the keyboard, data recorder and/or disk drive.

Made of solid pine, the DeskMate assembles easily to make a sturdy attractive unit. Its construction features slotted joints and pre-drilled holes. All necessary fasteners and glue are included. No-mar pads protect desk-top finishes while preventing the DeskMate from sliding. The DeskMate weighs 15 lbs. and measures 36″ x 13″ x 12″.

The DeskMate sells for $44.95 plus $5.00 shipping. Inquiries and orders should be directed to HOLLISCRAFT, P.O. Box 465, Oakdale, MA 01539.

"I SPEAK BASIC TO MY COMMODORE-64™"

I SPEAK BASIC TO MY COMMODORE-64 is a field-tested computer literacy course that introduces students to BASIC language programming and the operation of a Commodore-64 microcomputer. The series includes a Teacher's Manual, Student Text, and Exam Set.

Written by Aubrey Jones and published by the Hayden Book Company of Hasbrouck Heights, New Jersey, I Speak BASIC to My Commodore-64 is designed for teachers regardless of their knowledge of microcomputers and their programming skill.

The core of the course is the Student Text that features learning objectives, definitions and examples of key terms and BASIC concepts in class programming exercises, practices and assignments. Each version includes chapters explaining the parts and operation of the microcomputer. Chapters cover BASIC programming topics such as Mathematical Operations, Scientific Notations, Conditional and Unconditional Branching, Input Statements, Loops, Reading Data, Video Display Graphics, Arrays and Subroutines.

The Teacher's Manual provides techniques for presenting the material and emphasizing particular concepts, annotations to aid in lesson planning, suggestions for implementing the course and answers to all practice exams.

The Exam Set contains 12 quizzes on spirit duplicating masters to check student understanding and reinforce learning. The quizzes can be easily reproduced for class use. A Classroom set of I Speak BASIC contains one Teacher's Manual, 20 Student Texts and one Exam Set.

Hayden Book Company, Inc.
10 Mulholland Drive
Hasbrouck Heights, NJ 07604
(201) 393-6306

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PM+(TM)—A user friendly software product designed for the project manager. This program computes the critical path and/or project schedule for a project. It is designed to be useful for the individual who has little, or no experience with the techniques of critical path scheduling and project management. One unusual feature in this product is the ability to enter up to ten different cost items (five levels of manpower with different wage rates and duration of time spent on an activity; three types of material with estimated usage, unit measure, and cost; capital equipment costs; and miscellaneous expenses) for each activity in the project. Another unusual feature is the ability to enter actual cost data and compare the initial cost estimates with actual expenses. A third unusual feature is the use of data sheets to develop and record the data needed for the program.

Immediately available on disk for the Commodore 64. Price: $129.95.

LAWCO Ltd.
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408 733-0739

HUMAN ENGINEERED SOFTWARE'S TURTLE TOYLAND JR.

For children aged six and up, the challenge of learning about computers and computer concepts has been made easier—and a lot more fun—with the introduction of Turtle Toyland Jr. by Human Engineered Software.

Available for the Commodore 64, Turtle Toyland Jr. operates with just a joystick, teaching children computer concepts by moving a turtle across the computer screen to build film strips.

"Turtle Toyland Jr. is an ideal introduction to creative programming for young children," said Dr. Sueann Ambron, director of educational software at Human Engineered Software. "The program translates a child's joystick movements into reproducible turtle graphics. As a side effect of this creative play, children learn programming concepts and techniques."

To achieve the best results from the game, Ambron recommended following a carefully designed sequence of activities, beginning with a playground to discover how to move the turtle and draw images. From this introductory phase, children move on to turtle training and then on to the Crossroads to decide where to go next.

After a stop in Training Land, children can try four other sequences: Music Land, Sprite Land, the Toybox and Input/Output Land. In Music Land, children can learn to write their own music using the joystick to control notes from a piano, horn, guitar and flute. The music created can be stored in The Toybox.

Children in Sprite Land fill in squares with the turtle to draw sprites, which are animated drawings. Sprites can also be stored in The Toybox. In Input/Output Land, saved files in The Toybox can be called up and played with again.

"Turtle Toyland Jr. is a perfect precursor to any beginning programming language," added Ambron. "It allows children to play with programming concepts at a very early age. In addition, it feeds directly into our more advanced Turtle Graphics."

Turtle Toyland Jr. was developed jointly by Human Engineered Software and Childware Corporation, an innovative software development group.

MINNESOTA FAT'S POOL CHALLENGE

World famous pool expert, Minnesota Fats, has dared players to beat him at his own game. This time, though, he'll be using a joystick instead of a pool cue in the Minnesota Fats' Pool Challenge, an electronic pool game introduced by Human Engineered Software.

With the look and feel of the real thing, the Minnesota Fats Pool Challenge requires all the skill, precision and finesse found in a poolhall. Available for the Commodore 64, this exciting game includes six different play options and accommodates one or two players.

The game substitutes a joystick or computer function keys for a pool cue. A power gauge determines the speed of each shot and the position of the cursor guides the direction of the ball, making it possible to carom shots.

The game is as realistic as possible. The dimensions of a real pool table were used in designing the game.

The six different options for the game include three games for one player: sinking the balls in any pocket, pocketing the balls in order, and shooting the balls in their assigned pockets. Two players can choose from three games: sinking each

ball in its pocket and scoring the pocket, Mini-Pool, and a game where one player "pots" balls 1-6 while the other player pots 6-1.

To keep track of the real pool experts, the Minnesota Fats' Pool Challenge displays high scores.

Available on cartridge for the Commodore 64, the game's suggested retail price is $29.95.

Human Engineered Software markets a full line of advanced cartridge- and disk-based utility, entertainment, education, productivity and business software under the HesWare™ brand name, as well as peripheral products.

THE NUMBER GARDEN FROM SOFTSMITH

Correct answers to math problems grow brightly colored flowers in The Number Garden from Softsmith. Wrong answers sprout weeds, but math students have three tries to get rid of a weed before the correct answer is provided. Extremely easy to use, this delightful Softsmith educational program for the Commodore 64 is equally suited for home and classroom use.

One of the most impressive features of The Number Garden is that it automatically increases or decreases the difficulty of each problem in response to how quickly and accurately the student answered the preceding problem. Each learner's needs are accommodated by this special feature which adjusts the difficulty of each problem for each individual using The Number Garden. Talented students can progress quickly to the higher, more challenging levels . . . which are very difficult. Students who require more work are able to gain additional practice at the more basic levels.

In The Number Garden, where birds sing and the sun always shines, math is beautiful! Drilling with whole numbers, decimals and fractions in the four basic math functions is fun and colorful. So is converting decimals to fractions and fractions to decimals.

The Number Garden from Softsmith automatically records the name and final scores for each student. Progress can be monitored and printed easily and quickly to identify areas of strength and weakness. The student can see how he or she is doing while working since the score and skill level appear on the edge of the garden. Softsmith's The Number Garden is available for the Commodore 64 at a Suggested Retail Price of $39.95.

COMMODORE 64 GETS AWAY FROM BASICs

Limbic Systems, Inc., a California-based firm specializing in computer peripherals and software for the Commodore Computer line, introduces the PASCAL COMPILER for the Commodore 64™. The PASCAL COMPILER represents a major advancement in the programmability of the Commodore 64, providing a professional, business/scientific tool capable of handling complex and sophisticated applications.

Pascal, a programming language, simplifies development of software for customized applications. Pascal simplifies and reduces program development time by allowing for highly modularized coding, employing predefined procedures and functions. This characteristic of Pascal minimizes debugging time, the major task in program development. The self-documenting, structured coding provided by Pascal makes it the preferred computer language for teaching programming skills to and use by computer students.

The Pascal Compiler was developed by Oxford Computer Systems (Software) Ltd., authors and developers of the *PETSPEED for the Commodore 8000, 4000 and 64 computers—the BASIC compiler recommended by Commodore.

The Compiler generates efficient native code for the Commodore microprocessor, resulting in fast executing programs demanded by the business/scientific environment. The following utilities are provided as an aid to programming development: a linker (allowing for combining assembler code into the program), debugging facilities, and an editor.

The documentation provides a tutorial on Pascal program development through the compilation process, as well as offering the user an easy access reference.

The PASCAL COMPILER is being distributed in the United States by Limbic Systems, Inc., and is anticipated to retail for approximately $50. Inquiries should be directed to Limbic Systems, 560 San Antonio Road, Suite 202, Palo Alto, California 94306; (415) 424-0168.

*PETSPEED is a trademark of Oxford Computer Systems (Software), Ltd. Commodore 64 is a trademark of Commodore Electronics, Ltd.

CONSTELLATIONS I (HEAVENLY BODIES)

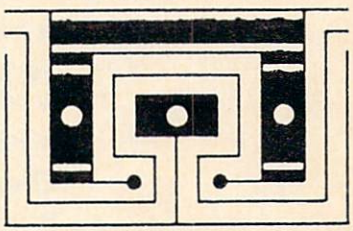
An educational program that's fun to use. It displays 12 different constellations on screen, from an available menu. You may also ask "Morcon" to name any of the stars that make up the constellations. This is done by moving a joystick directed magic wand (that looks suspiciously like an arrow) to the star in question; the name of the star will appear on screen when you press the fire button.

After viewing the constellation, you can request to take the quiz (also built in the program)—it keeps track of your correct answers and gives your score at the end of the quiz. Be warned, those who score too low may wake up as a frog in the morning!

Constellations I also comes with a small booklet that gives you more interesting facts about each constellation as you go through the viewing phase.

This is the first of six such programs which will list the majority of the named constellations and star clusters. This series is an excellent astronomy tutor without the "heavy math", stiff necks or mosquito bites.

For the Vic and 64—(tape only) $14.95.
Write: Morcon and Wizard Software
P.O. Box 360
Sandwich, Illinois 60548



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Attack of the Mutant Camels *from HES*
★ 20,850 Jason Ingel, W. Palm Beach, Fl.
★ 16,705 Gary Raftery, Atlanta, Ga.

Space Sentinel *from T & F Software*
★ 36,110 Lake Davidson, Anaheim, Ca.
★ 27,460 Eric Wolff, Boise, Id.

Pooyan *from Datasoft*
★ 575 Cathy Haley, Boston, Ma.
★ 560 Jon Stoneberg, Houston, Tx.

Serpentine *from Creative Software*
★ 10,000 Marshall Smith, Eerie, Pa.
★ 8,500 Kevin Clough, Norfolk, Va.

Choplifter *from Creative Software*
★ 6,405 Mark Petersen, Salem, Or.
★ 5,200 Paul DeLorenzie, Newark, NJ

Shamus *from Synapse*
★ 310 Brenda Carson, Baltimore, Md.
★ 295 Thomas Brakken, Las Vegas, Nv.

Blue Max *from Synapse*
★ 5,615 Terry Young, Richland, Wa.
★ 5,410 Brad Hinman, Omaha, Ne.

Riverchase *from Cyberia*
★ 2,300 John Moody, San Jose, Ca.
★ 980 Gene Reynolds, Shreveport, La.

Frogger *from Parker Brothers*
★ 5,600 Roger Chase, Great Neck, NY
★ 4,215 Becky Ricci, Sacramento, Ca.

Stix *from Skyles Electric Works*
★ 6,990 Richard Orona, Ukiah, Ca.
★ 6,890 Gerald Choo, Alberta, Canada

Knights of the Desert *from Strategic Simulations*
★ 3,680 Peter Lo, Salt Lake City, Ut.
★ 3,570 Burton Geiger, South Bend, In.

Telengard *from Avalon Hill*
★ 6,328,255,960 Tom Leavell, Portland, Or.
★ 4,263,145,830 Jeffrey Wilson, Champaign, Il.

All entries must be received by the first of the month to be eligible for the following month.

News Releases

ANGELSOFT SOFTWARE

Mindscape, Inc., has announced an exclusive agreement with Angelsoft, Inc. to publish an exciting array of fun-learning software written by Angelsoft founder and award winning children's book author Mercer Mayer.

Mindscape, formerly called SFN Electronic Publishing Company, is a newly-formed subsidiary of SFN Companies, Inc. (NYSE-SFN).

Mindscape's first line of software targeted to children ages four through eight is entitled SPROUT! Eight programs in the SPROUT! line will be built around Mayer's new TINK!TONK! characters.

Mindscape will release its first four SPROUT! programs in April and another four in September. The software will be compatible with the Commodore 64.

Features of the TINK!TONK! programs will include the teaching of basic educational skills such as letter and number recognition, counting, simple addition and subtraction and size and shape relationships. Children also become familiar with the computer and its operation.

The software utilizes bold, high resolution graphics and original music, professionally scored much like a motion picture production. Each of the four characters, Tink, Tonk, Tinka, and Tuk, has his or her own theme song.

As a successful children's book illustrator and author, Mayer brings a unique combination of skill and insight to Mindscape's production of the first SPROUT! programs.

Mindscape's parent company, SFN, is a leading educational and professional publisher based in Glenview, Illinois.

SUPER HEROES GAME SOFTWARE

ADVENTURE INTERNATIONAL has announced the signing of a long-term licensing agreement with MARVEL ENTERTAINMENT GROUP.

ADVENTURE INTERNATIONAL will create and market a series of at least twelve home computer graphic adventure games featuring the entire MARVEL UNIVERSE. MARVEL will create a special series of companion comic books tentatively called Quest Probe to tie into these programs.

Public announcement of the signing of the licensing agreement did take place at the Winter Consumer Electronics Show in Las Vegas in January, with the initial product release targeted for dealer shelves by late Spring 1984.

All Marvel characters are trademarks of the Marvel Entertainment Group. Super Heroes is a trademark co-owned by the Marvel Entertainment Group.

Continued from page 23

```
62 PRINT"[down][right, 5 times][rvs-on]YOU
   [sp]DIED"
63 POKESN+3,0:FORA=1TO2000:NEXT
64 POKE7676,0
65 POKE7679,PEEK(7679)-1:IFPEEK(7679)THENPO
   KESN+3,15:GOTO16
66 PRINT"[home][rvs-on][down, 7 times][rig
   ht, 7 times]GAME[sp]OVER[right, 10 times
   ][rvs-on]PUSH[sp]F1[sp]TO[sp]START":POK
   ESN+3,0
67 GETA$:IFA$<>""""THEN67
68 POKE36878,15:GOTO14
69 LV=LV+1:POKEM,160:POKEM+J,1:POKEM+J+P,0
70 IFLV=3THENPOKE7507,5
71 IFLV=5THENPOKE7507,2
72 IFLV=7THENA$="000040"
73 POKE887,0:POKESN+1,0:FORA=1TO20:POKESN,2
   40:FORB=1TO20:NEXT:POKESN,0:FORC=1TO3
74 FORB=1TO20:NEXT:POKESN,0:FORC=1TO3:NEXT:
   NEXT
75 GOTO16
```


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Continued from page 71

which key it was, we can proceed with whatever action the user has selected. Many programs accomplish this by means of a long series of IF. . .THEN tests. However, the efficient programmer uses the simple ON statement instead:

```
9040 ON F GOTO 9050, 9060, 9100,
   9110, 9150, 9160, 200, 200
```

Based on the value of F, the program will branch to one of the lines listed, i.e. to line 9050 if F1 was pushed, to 9060 if F2, etc. Of course, it will be up to the programmer to decide what to do when the program arrives at each of those lines.

PUTTING IT TO USE

How you put this menu to use, of course, is entirely up to you. Just remember to print the available choices on the screen first, then adjust the destination line numbers in line 9040, and take it from there.

ALL FOR NOW

Well, there it is—how to use the function keys in four BASIC steps. Now that you have the goods, try making more use of the function keys in your programs. You will find they add that extra touch of polish and professionalism.

Continued from page 78

```
1132 DATA 34, 44, 56, 13, 138, 78, 69, 87, 13
   , 135
1133 DATA 76, 73, 83, 84, 13, 139, 83, 89, 83
   , 32
1134 DATA 54, 52, 55, 51, 56, 13, 136, 82, 85
   , 78
1135 DATA 13, 140, 83, 89, 83, 52, 57, 49, 53
   , 50
1136 DATA 13, 0, 0, 0, 0, 0, 0, 0, 0, 0
```

Letters

Dear *COMMANDER:*

Your magazine has been very helpful to me this past year. When I bought my computer last spring, I knew absolutely nothing about programming. Today, though I'd be hard pressed to earn as much as a cup of coffee, I can at least understand in part what the programs I read in your magazine will do before I run them.

Thank you for the advice and useful programs I've been receiving through your magazine.

E.L.B.
Bethlehem, PA

To the Editor:

I recently purchased a copy of the COMAL SYSTEM 0.14 for the C64, and the COMAL HANDBOOK. I was so pleased with COMAL that after six weeks I started COMAL CLUB.

It is my opinion that COMAL is so superior to BASIC that everyone will be using it in the very near future. If you haven't tried it yet, please do so.

I sincerely hope that COMAL will be a regular feature in your magazine.

David Skinner
Clark County Commodore
Computer Club
Bismark, AR

Dear D.S.

The COMAL language is generating a fair amount of interest among our readers. Commodore has released a COMAL cartridge, and they are promoting COMAL through trade shows and press releases.

COMMANDER is in the process of preparing articles, programs and reviews about COMAL and its applications. Look in upcoming issues for more information.

The COMAL Users Group, 5501 Groveland Terrace, Madison, WI 53716 will send anyone interested an information pack if you send a SASE with your inquiry.

The Editor

To the Editor:

I have a C-64 and would like to add a color plotter to my system. Do you have any information about plotter/printers?

T.Z.
Reno, NV

Dear T.Z.

Commodore markets the C-1520 plotter/printer. It prints on 4½ inch paper and uses four color pens. An alternative to the C-1520 is the soon to be released MCS-801 eight color printer. You should contact your nearest Commodore dealer for details.

To the Editor:

Where would I find a replacement for a broken VIC-20 key? I have contacted dealers in my area, but have not found a source for spare parts.

S.A.M.
Houston, TX

Dear S.A.M.

After several calls, I also have found that dealers do not carry replacement parts for Commodore products. The best solution seems to be a service call. If any of our readers know where to find parts, we would appreciate hearing from you.

The Editor

15) Congratulations; you're done! Slip some 2716 EPROM's into the sockets and put the case back together. While fitting the two case halves, dress the ribbon cable in such a way that it won't get crimped or interfere with the screw hole. Snap the two case halves together then insert and tighten the single mounting screw.

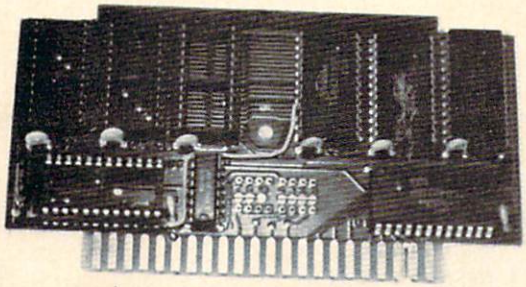


Figure 10

USING THE RAM/ROM CARTRIDGE

You will find that work with the RAM/ROM cartridge goes best if your VIC-20 is fitted with a RESET switch, although this isn't absolutely essential. Let's see how a typical session might go. For argument's sake, assume that the ROM's at $A000 contain a programmer's aid utility with the auto-start feature. With the switch in the ROM position, you fire up your VIC-20. What happens?

Well, very conveniently, the computer fires up with the programmer's aids already installed and ready to go! It's just like your VIC-20 has a new and expanded operating system.

Now suppose that you want to use your machine language monitor which also sits at $A000 and can be loaded from disk. To get it running is easy: simply flip the RAM/ROM switch to the RAM position, hit your RESET button to reinitialize your VIC-20 to a cold start, and then load in the monitor from disk. Since there is now RAM sitting at $A000, this is possible.

Figure 11

As you can tell, it's easy to flip back and forth from RAM based to ROM based software now. This not only simplifies the daylights out of using various forms of software, but also opens up the door for more advanced applications.

A good question you might have is what sort of software is best to have in ROM. The answer to this clearly depends on what sort of work you do most often. If you're a BASIC programmer, you probably will want to have a programmer's aid in ROM ready to use whenever you sit at the computer.

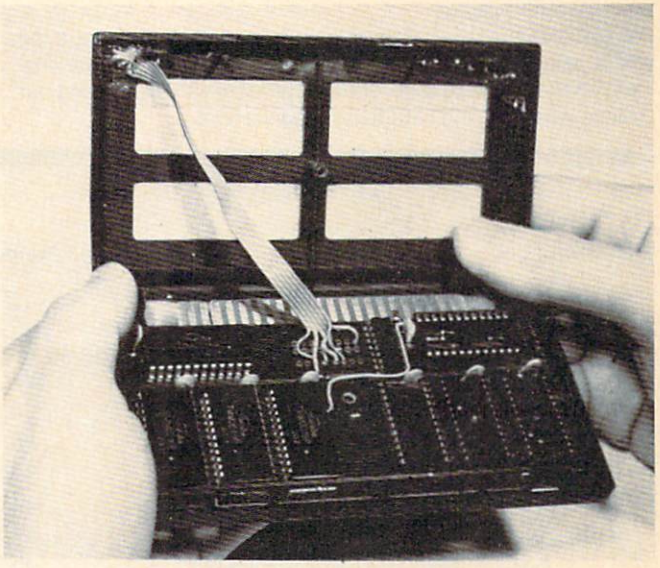
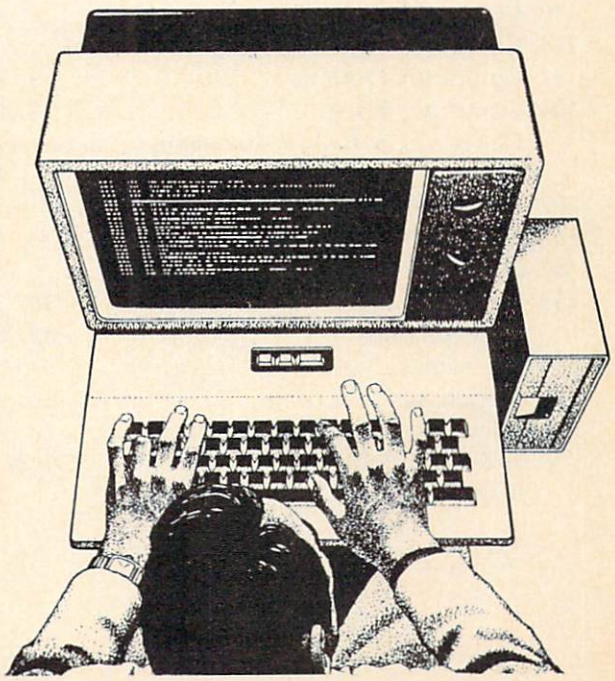


Figure 12

Machine language programmers will want to have monitors and assemblers handy at all times for debugging work. Writers might like to pop a word processor program into the ROM's and this would tremendously simplify the fireup procedure for them. As you can tell, the sky's the limit! So, if you need auto-start software on your VIC-20, but also like having RAM available for other purposes, consider modifying your Commodore 8K cartridge to include ROM's.



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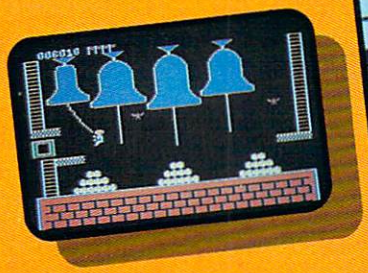

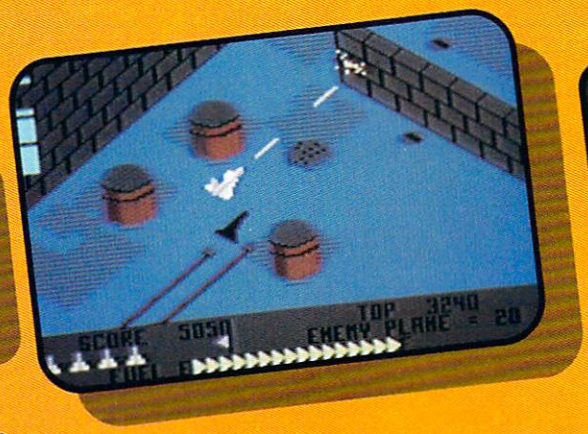

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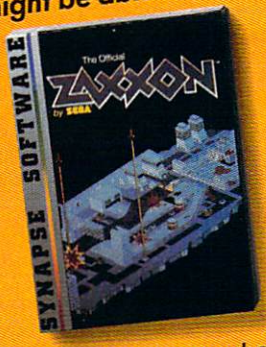

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